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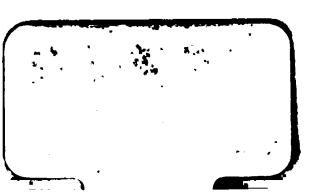

# ONE THOUSAND

# ARITHMETICAL TESTS;

OR, THE

## EXAMINER'S ASSISTANT;

SPECIALLY ADAPTED, BY A NOVEL ARRANGEMENT

OF THE SUBJECT,

FOR

## EXAMINATION PURPOSES;

BUT ALSO SUITED

## For General Use in Schools.

BY

T. S. CAYZER,

HEAD MASTER OF QUEEN ELIZABETH'S HOSPITAL, BRISTOL.

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# ADVERTISEMENT.

THIS little book is not put forth as a substitute for any of the excellent works on Arithmetic, now so generally used in schools; but rather as an ally and supplement to all of them.

It is a frequent complaint that when this subject is pursued solely on the course laid down in the various text-books, many rules and operations, apparently mastered at the time, prove to be forgotten. Thus, after working all the examples in "Powers and Roots"—which as usually given would probably occupy about a fortnight—a majority of the class would hesitate at a sum in Interest; Duodecimals would in like manner drive out Loss and Gain; and after a series of exercises in abstract numbers, a want of readiness in Weights and Measures would be but too apparent. It is true that examples from the back rules might at any time be set; still the selection would always be attended with inconvenience.

This is obviated by the arrangement here proposed. All the operations of Arithmetic have been presented under 40 heads; and on opening at any one of the 26 examination papers, a complete set of examples appears; so that the whole subject can be gone over in a few hours. The same order is preserved throughout, the 5th, for instance, being always an exercise in Reduction, the 29th in Proportion, the 39th in Areas, and so on. At the same time the examples have been carefully graduated; the quarry, therefore, may

be worked horizontally, as well as vertically—the strata throughout having a parallel dip, though increasing in hardness. Each No. 1, 2, 3, 4, &c., thus growing longer and more difficult, it follows that the latter papers, R, S, T, U, &c., will demand a considerable amount of skill; indeed little fear of failure in this subject, at any of the public examinations, need be entertained by any one who could readily and accurately work such specimens of the various operations.

The object being to ascertain whether pupils are well up in the manual praxis, problems, so called, have been avoided as much as possible. Such enigmas may be amusing and even useful for home practice, but are hardly suitable at examinations, in which the aim is to get a large amount of work turned out, with the greatest accuracy, in the least time *. Among the "Miscellaneous Exercises" in Arithmetic, there are often found questions that are quite unfair, belonging rather to Mensuration or to Algebra.

The above twofold use of these exercises—collectively, down the page, if for examinations; consecutively, across the pages, if for working up any particular rule—is recommended from experience. All the examples have been selected from the papers worked by the boys of Queen Elizabeth's Hospital, Bristol; for the four divisions of which school, the arbitrary arrangement of the subject was originally intended; and is now retained, as being on the whole the most even and natural one. In conclusion, the author would recommend all teachers who are inclined to give this system a trial, to cause their pupils to work *all* the exercises in each paper; the first ten quite as much as the last. With a view to this, no Tables have been inserted; indeed, in all examinations, they ought to be inaccessible.

* What with the time spent in puzzling over Problems, and in getting up absurd displays of Mental Arithmetic, many boys on leaving school find themselves unable to add up correctly a tradesman's account, or to work an ordinary sum in percentage.

# ORDER.

| | | |
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# ARITHMETICAL TESTS.

## A.

1. Forty-eight + seventy + sixty-nine + twelve + three + eighty-nine + fourteen + twenty + fifty-one + ten = ?
2. From fifty-one subtract thirteen.
3. Multiply six hundred and seventeen by eight.
4. Divide seven thousand and eighty-one by four.
5. Reduce sixty thousand pence to sovereigns.

6.

| £ | *s.* | *d.* |
|---|---|---|
| 3 | 5 | $8\frac{1}{2}$ |
| 7 | 6 | 7 |
| 4 | 13 | 2 |
| 8 | 12 | $7\frac{1}{2}$ |
| 9 | 5 | $6\frac{1}{4}$ |
| 7 | 9 | $9\frac{3}{4}$ |
| 2 | 7 | 6 |
| 3 | 15 | $0\frac{1}{2}$ |

7.

| *lbs.* | *oz.* | *dwt.* | *grs.* |
|---|---|---|---|
| 6 | 10 | 2 | 21 |
| 1 | 3 | 14 | 7 |

8. £12 14*s.* $9\frac{1}{4}$*d.* × 5

9. £3681 17*s.* 1*d.* ÷ 5

10. Reduce £148 16*s.* $7\frac{1}{4}$*d.* to farthings.

11. Resolve 135 into its prime factors.
12. Find L. C. M. of 15, 20, 27, 36.
13. Find G. C. M; and reduce $\frac{72}{192}$ to lowest terms.
14. Reduce $4\frac{53}{101}$ to an improper fraction.
15. Find the sum of $\frac{3}{8}$, $\frac{5}{6}$, $\frac{2}{3}$.
16. From $\frac{5}{14}$ take $\frac{2}{7}$.
17. Multiply $\frac{5}{6}$ by $\frac{15}{16}$.
18. Divide $\frac{14}{15}$ by $3\frac{1}{2}$.
19. Find value of $\frac{11}{14}$ guinea.
20. Reduce 5*s.* $6\frac{1}{2}$*d.* to fraction of £1.
21. 1296 articles at $5\frac{3}{4}$*d.* each (by Practice).

## A.

22. Change ·375 into its equivalent vulgar fraction.

23. 3·465 + 21·73 + 984·2 + 385· + 263·71 + ·0895 + 300· = ?

24. From 389·1473 take 289·82.

25. Multiply 837·2 by 2·954.

26. Divide 120·3482 by 3·29.

27. Find value, in positive terms, of £·3875.

28. Reduce £·045 to decimal of 15*s.*

29. What is the price of 376 acres of land, if 240 acres cost £14,295 ?

30. If 36 men in 4 days can finish 120 suits of clothes; how many men could finish 210 such suits in 9 days of the same length ?

31. Required the square of 327.

32. What is the square root of 81225 ?

---

33. Find the simple interest of £263 10*s.* for seven years at 6 per cent.

34. What is the present worth of a bill of £200, due six months hence, allowing (true) discount at 5 per cent. ?

35. If coals are bought at 15*s.* 10*d.* per ton, and sold at 16*s.* 7½*d.* per ton; what is the gain per cent ?

36. A and B enter business as partners, A putting in £450, and B £600. If they lose £350, how must the loss be apportioned between them ?

37. How much sugar, worth £3 12*s.* 3*d.* per cwt., must be given in exchange for 12 ton 1 qr. 15 lb. of brimstone at £27 10*s.* 4*d.* per ton ?—Ans. ( ) cwt. ( ) qr. ( ) lbs. (neglecting fractions).

38. How much stock can be bought for £3000, when the funds are at 90 ?

39. Multiply 100 ft. 9 in. by 40 ft. 6 in.—Ans. ( ) s. y. ( ) s. f. ( ) s. in.

40. What is the content of a block of stone whose length is 5 ft. 9 in.; and breadth and thickness each 3 ft. ?—Ans. ( ) c. ft. ( ) c. in.

---

## B.

1. Three hundred and seven + two hundred and eighty + thirty-six + seven hundred and forty-nine + nine hundred and ten + fifty-four + twelve hundred + ninety-six + five hundred and thirty-seven + four hundred and one + eighty-six.

2. From eight hundred and sixty subtract seven hundred and ninety-four.

3. Multiply eight thousand six hundred and seventy-nine by eight.

4. Divide twenty thousand and thirty by seven.

5. In eighteen thousand seven hundred and ninety-eight shillings, how many half-pence?

6.

| £ | s. | d. |
|---|---|---|
| 41 | 17 | $9\frac{3}{4}$ |
| 639 | 15 | 8 |
| 3 | 8 | $6\frac{1}{2}$ |
| 45 | 17 | $0\frac{3}{4}$ |
| 287 | 18 | $8\frac{1}{4}$ |
| 56 | 7 | $5\frac{1}{2}$ |
| 9 | 0 | 7 |
| 28 | 13 | $6\frac{3}{4}$ |
| 386 | 2 | 1 |

7.

| £ | s. | d. |
|---|---|---|
| 8291 | 18 | 6 |
| 985 | 0 | $9\frac{1}{4}$ |

8.

| *mon.* | *wks.* | *days.* | |
|---|---|---|---|
| 38 | 3 | 6 | × 9 |

9.

| *lbs.* | *oz.* | *drs.* | *scr.* | *grs.* | |
|---|---|---|---|---|---|
| 16 | 10 | 2 | 2 | 8 | ÷ 8 |

10. Reduce 5 ton 18 cwt. 2 qrs. 18 lb. to lbs.

---

11. Resolve 1440 into its prime factors.
12. Find L. C. M. of 30, 16, 40, 12.
13. Find G. C. M; and reduce $\frac{264}{336}$ to lowest terms.
14. Reduce $\frac{501}{9}$ to a mixed number.
15. Add together $\frac{3}{11}$, $\frac{3}{14}$, $\frac{3}{10}$, $\frac{3}{7}$.
16. Find difference between $\frac{7}{18}$ and $\frac{22}{27}$.
17. Multiply $6\frac{1}{2}$ by $\frac{8}{39}$.
18. Divide $\frac{21}{25}$ by $\frac{28}{35}$.
19. Find the value of £$\frac{7}{8}$.
20. Reduce $\frac{7}{3360}$ ton to fraction of 1 quarter.
21. 4985 articles at $5\frac{1}{2}d.$ (by Practice.)

## B.

22. Change $\frac{15}{12}$ into its equivalent decimal fraction.

23. 316·7 + 4·29 + 382 + ·0043 + ·516 + 3·8277 + 89·949.

24. From 3645·8 take 59·333.

25. Multiply 63·827 by 53·18.

26. Divide 1·432923 by ·3279.

27. Express in positive terms ·875 ton.

28. Reduce ·03125 mile to decimal of 1 pole.

29. If 15 tables cost £73 14*s.* 8¼*d.*, what will be the price of 11 of the same?

30. In 3 days 24 men cut 60 acres of grass; in how many days would 30 men cut 84 acres?

31. What is the cube of 27?

32. Find the square root of 96177249.

---

33. What is the amount of £323 3*s.* 4*d.* for 9$\frac{3}{5}$ years at 5 per cent. simple interest?

34. What is the (true) discount on £420 6*s.* 8*d.* for 7 months, reckoning 3½ per cent.?

35. Bought gum at 58*s.* 4*d.* per cwt.; at what price per lb. must I sell it to gain 4 per cent.?

36. Three men, A, B, C, make a venture by which they gained £720. How must this profit be shared: A having contributed £90, B £120, and C £150.

37. Exchange £318 7*s.* 9*d.* British, to Hamburgh money; £1 British being equal to 13 marks, 5 schillings (16 sch. = 1 mk.).

38. How much stock can be bought for £3900, the price being 92$\frac{3}{8}$, and commission ¼ per cent.?

39. A garden wall is 63½ yards long, and 15 ft. 4 in. high; what is its surface (on one side only)?—Ans. ( ) s. y. ( ) s. ft. ( ) s. in.

40. A log of mahogany is 10 ft. 6 in. in length, 3 ft. 4 in. in breadth, and 2 ft. 10 in. in depth. Required its content in cubic feet.

---

## C.

1. Four hundred and sixty-seven + three thousand and eighty-nine + eight hundred and fifty-three + twelve hundred and six + ninety-eight + four hundred and fifty-three + nine thousand and nine + seven hundred and eighty-five = ?

2. From twenty-six thousand and thirty-five take fifteen thousand three hundred and nine.

3. Multiply twenty-nine thousand five hundred and eighty-nine by ninety-seven.

4. Divide three hundred and forty-eight thousand by forty-nine, in two short divisions (leave the work).

5. Reduce fifty-eight thousand and seventy-six guineas to half-pence.

6.

| £ | s. | d. |
|---|---|---|
| 63 | 18 | $9\frac{1}{2}$ |
| 74 | 17 | $7\frac{2}{4}$ |
| 69 | 14 | 11 |
| 8 | 9 | $8\frac{1}{3}$ |
| 77 | 16 | $6\frac{2}{4}$ |
| 9 | 19 | $4\frac{1}{3}$ |
| 86 | 15 | $9\frac{1}{4}$ |
| 47 | 13 | $5\frac{1}{3}$ |
| 149 | 17 | $6\frac{1}{4}$ |
| 86 | 9 | $11\frac{3}{4}$ |

7.

| lbs. | oz. | dwt. | grs. |
|---|---|---|---|
| 12 | 11 | 14 | 18 |
| 6 | 9 | 17 | 23 |

8.

| qrs. | bus. | pk. | gal. | qt. |
|---|---|---|---|---|
| 3 | 5 | 3 | 0 | 3 × 11 |

9.

| lbs. | oz. | drs. | scr. | grs. |
|---|---|---|---|---|
| 78 | 6 | 6 | 0 | 9 ÷ 7 |

10. Reduce 3 weeks, 4 days, 48 min. to seconds.

11. Resolve 540 into its prime factors.

12. Find L. C. M. of 55, 45, 40, 33, 60.

13. Find G. C. M, and reduce $\frac{112}{1414}$ to lowest terms.

14. Reduce $\frac{2865}{35}$ to a mixed number.

15. Find the sum of $\frac{3}{7}$, $\frac{3}{5}$, $\frac{4}{7}$.

16. What is the difference of $\frac{5}{22}$ and $\frac{8}{33}$.

17. Multiply $\frac{3}{5}$ by $\frac{2}{7}$ of $\frac{6}{11}$

18. Divide $5\frac{3}{5}$ by $\frac{35}{102}$.

19. Express in positive terms $\frac{3}{17}$ ton.

20. Reduce $3\frac{1}{2}$ days to fraction of 1 week.

21. Find value of 849 lbs. of cocoa at $10\frac{3}{4}d.$ per lb. (by Practice.)

## C.

22. Transform ·16 into its equivalent vulgar fraction.

23. 3·827 + ·495 + 16·3 + ·0528 + 63·5 + ·29415 + ·00085 = ?

24. Subtract 38·9195 from 537·01624.

25. Multiply ·00007963 by 540·.

26. Divide 1732·8 by ·475.

27. Express in positive terms 3·68125 lb. Troy.

28. Reduce 1*s.* 3*d.* to decimal of £1.

29. If 2 ac. 1 r. 12 pol. of land are rented for £6 3*s.* 6*d.* what will be the rent of 13 ac. 0 r. 28 poles?

30. What will the grazing of 121 colts amount to for 45 weeks; when the grazing of 18 colts for 77 weeks cost £70 14*s.*?

31. Required the cube of 586.

32. Find the square root of 3156641856.

33. What will £249 13*s.* 9*d.* amount to in 7 years at 4 per cent. simple interest?

34. Find the present worth of a bill of £624 11*s.* 2*d.* due 177 days hence; discount at 5½ per cent.

35. Bought a pianoforte for £13; and sold it for £14 12*s.* 6*d.*; what did I gain per cent. on my outlay?

36. Three merchants freight a ship with 420 pipes of wine; of which 140 belonged to A; 105 to B; and the rest to C. During a storm the sailors were obliged to throw overboard 84 pipes. What portion of the loss must each merchant sustain?

37. How much land at £2 4*s.* 3*d.* per acre ought to be rented as an equivalent for 75 cwt. 1 qr. 16 lb. of butter, worth 29*s.* 9*d.* per cwt.?

38. If I invest £1200 in the Three-and-a-half per Cents. when that stock is at 86, what income shall I derive therefrom?

39. A courtyard is 25 ft. 4 in. long, and 20 ft. 3 in. wide; what is its area in yards?

40. How many cubic feet of timber are there in a spar whose length is 30 ft. 4 in., breadth 2 ft. 6 in., and depth 2 ft. 2 in.?

## D.

1. Eight thousand four hundred and twenty-nine + ten thousand and eighty-seven + three thousand nine hundred and eighty-five + twenty thousand six hundred + sixty-nine-thousand and sixty-nine + nine hundred and forty-five + thirty thousand and seventy-eight.

2. From four hundred and eight thousand and ten take eighty-nine thousand one hundred and nine.

3. Multiply thirty-eight thousand two hundred and seventy-four by three hundred and sixty-seven.

4. Divide four hundred and five thousand and fifty-three by forty-eight, in two short divisions (exhibiting the work).

5. Reduce seventy thousand eight hundred and forty-seven tons to lbs.

6.

| *fathoms.* | *feet.* | *in.* |
|---|---|---|
| 2 | 4 | 10 |
| 3 | 0 | 4 |
| 6 | 5 | 9 |
| 12 | 3 | 9 |
| 7 | 4 | 8 |
| 6 | 2 | 7 |
| 8 | 5 | 6 |
| 12 | 4 | 5 |
| 3 | 4 | 11 |
| 7 | 2 | 9 |

7.

| *E. ells.* | *qrs.* | *nls.* |
|---|---|---|
| 7 | 2 | 1 |
| 5 | 3 | 3 |

8.

| £ | *s.* | *d.* | |
|---|---|---|---|
| 46 | 12 | $9\frac{3}{4}$ | × 54 |

9.

| *wks.* | *dys.* | *hrs.* | *min.* | *sec.* | |
|---|---|---|---|---|---|
| 231 | 1 | 18 | 44 | 6 | ÷ 9 |

10. Reduce 39857 grains (apoth.) to oz.

11. Resolve 4410 into its prime factors.

12. Find L. C. M. of 24, 36, 12, 30.

13. Find G. C. M.; and reduce $\frac{627}{1092}\frac{13}{42}$ to lowest terms.

14. Reduce $5\frac{3}{101}$ to the form of an improper fraction.

15. Add together $\frac{3}{8}$, $\frac{2}{5}$, $\frac{19}{20}$, $\frac{11}{12}$.

16. From $\frac{3}{4}$ subtract $\frac{3}{7}$.

17. Multiply $\frac{6}{7}$ by $\frac{5}{11}$.

18. Divide $\frac{3}{25}$ by $\frac{7}{10}$.

19. Find value of $\frac{5}{14}$ of £2.

20. Reduce $\frac{18}{19}$ of 1*d.* to fraction of £1.

21. 849 articles at $11\frac{3}{4}d.$ each (by Practice).

## D.

22. What decimal fraction is equivalent to $\frac{9}{64}$?

23. $41{\cdot}86 + 157{\cdot}9 + {\cdot}00263 + 19{\cdot} + {\cdot}84 + 15{\cdot}13637 = ?$

24. What is the difference of 362·81945 and 7638·4123?

25. Find the product of ·0009876 and 8050·.

26. Divide 24122·085 by ·00309.

27. Find in positive terms the value of ·68125 lb. apoth.

28. What decimal of 1 cwt. is 1 lb. 12 oz.?

29. If 16 cwt. 2 qr. 12 lb. of sugar cost £30 3*s*. 9*d*., what will be the cost of 18 cwt. 3 qr. 8 lb.?

30. Supposing that 56 sacks of flour will support a garrison of 350 men for 40 days, for how long a time would 250 men be supported on 21 sacks?

31. Find the 4th power of 78.

32. $\sqrt{789329025} = ?$

---

33. If I lend £749 1*s*. 3*d*. at 4 per cent., how much shall I receive in addition to the principal at the end of $3\frac{1}{2}$ years?

34. Calculate the (true) discount on a bill of £77 14*s*. 1*d*. due on September 21st, but paid on May 11th, allowing 6 per cent.

35. A grocer bought goods to the amount of £184 11*s*. 8*d*.; for how much must they be sold to make a profit of 7 per cent.?

36. Divide a bag of 176 nuts between two boys, in such a way that as often as A takes out 7, B takes out 9.

37. How many rupees at $23\frac{3}{4}d$. each must be exchanged for £148 16*s*. 8*d*.?

38. When Four per Cent. Stock is at $93\frac{1}{2}$, how much of that stock will £2992 purchase?

39. A rectangular field is 258 yards long and 97 yards wide; what is its area?—Ans. ( ) acres ( ) yds.

40. Required the content of a block of stone, of which the length is 5 ft. 9 in., and breadth and thickness each 3 feet.—Ans. ( ) cub. ft. ( ) cub. in.

---

## E.

1. Twenty-seven thousand and eight + three thousand and nineteen + seventy-seven thousand and ten + eight hundred and seventy-three + fifty thousand nine hundred and seven + twelve thousand two hundred and ninety-six + eighty thousand + eighteen hundred and seventeen.

2. Subtract three million three thousand five hundred and seventeen from seven million six hundred and two thousand five hundred and eighty.

3. Multiply seven hundred and eighty-nine thousand six hundred and fifty-eight by seven thousand and ninety-eight.

4. Divide three million forty thousand and nine by thirty-seven.

5. Reduce fifteen million seven hundred and fifty-nine thousand three hundred and sixty scruples to lbs.

6.

| £ | s. | d. |
|---|---|---|
| 4 | 12 | $8\frac{1}{2}$ |
| 6 | 17 | $9\frac{2}{4}$ |
| 8 | 0 | $5\frac{1}{4}$ |
| 7 | 12 | $11\frac{3}{4}$ |
| 6 | 18 | $7\frac{1}{4}$ |
| 7 | 15 | $10\frac{1}{2}$ |
| 4 | 19 | $6\frac{1}{2}$ |
| 12 | 7 | 3 |
| 8 | 14 | $7\frac{3}{4}$ |
| 6 | 8 | $9\frac{1}{2}$ |

7.

| qrs. | bus. | pk. | gal. | qts. | pts. |
|---|---|---|---|---|---|
| 61 | 3 | 0 | 0 | 3 | 0 |
| 5 | 7 | 0 | 1 | 0 | 1 |

8.

| £ | s. | d. |
|---|---|---|
| 2468 | 7 | $5\frac{1}{4}$ × 28 |

9.

| lbs. | oz. | dwt. | grs. |
|---|---|---|---|
| 63 | 3 | 13 | 18 ÷ 5 |

10. Reduce 385822 in. to miles; write out answer with proper headings.

11. Resolve 19404 into its prime factors.

12. Find L. C. M. of the nine digits.

13. Find G. C. M.; and reduce $\frac{7}{7}\frac{5}{3}\frac{5}{0}\frac{2}{2}\frac{}{4}$ to lowest terms.

14. Reduce 17 to an improper fraction with denom. 90.

15. Find the sum of $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$.

16. Subtract $\frac{1}{3}\frac{}{1}$ from $\frac{5}{1}\frac{}{4}$.

17. Find the product of $\frac{3}{5}$, $\frac{2}{7}$, $\frac{6}{11}$.

18. Divide $\frac{5}{7}$ by $\frac{6}{11}$.

19. Express in positive terms $\frac{3}{5}$ of 2 guineas.

20. Reduce 4 E. ells to fraction of 15 yards.

21. 3156 at 4*s.* 7¼*d.* (by Practice.)

## E.

22. What vulgar fraction is equivalent to ·109375?

23. ·0635 + 421·6 + 1703·294 + 6·1842 + 735· + 209·67 + ·2123 + 72·548 + ·00063 = ?

24. Subtract 237·909375 from 3714·0062.

25. Find the product of ·1097 and ·1331.

26. Divide 3·4656 by 237·5.

27. Find value of £6·3845.

28. Reduce £43 10*s.* to decimal of 5 guineas.

29. A bankrupt owes £4458, and has but £1040 4*s.* to pay it with; how much can he pay in the pound?

30. If 12 horses, working 12 hours a day, can plough a field 720 yards long and 350 yards broad in 3 days, how many will be required to finish a piece 800 yards long and 210 yards wide, in 6 days of 8 hours each?

31. What is the second power of thirty-six thousand and seventy-four?

32. What number, multiplied by itself, will produce 1301333476?

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33. How many years would a principal of £374 15*s.* 7½*d.* be gaining £104 18*s.* 9$\frac{3}{10}$*d.*, reckoning interest at 8 per cent.?

34. What sum ought I, on January 3rd, to take in payment of a bill of £3685 2*s.*, due on February 26th, allowing (true) discount at 6½ per cent.?

35. A man bought a horse, and sold him immediately for £54 17*s.* 3*d.*, thereby making a profit of 4½ per cent. on his outlay. What did he give for him?

36. Three merchants enter into partnership. A puts £1400 into the business, B £800, and C £1000. Having gained £350, how must they share it?

37. How much wine at £228 10*s.* per pipe (of 126 gallons) ought to be exchanged for 179 cwt. 3 qr. 25 lb. of coffee, worth £3 11*s.* 3*d.* per cwt.?—Ans. ( ) pipe ( ) gall. ( ) qts.

38. Calculate the premium of insurance on £2973 7*s.* 6*d.* at the rate of £2 16*s.* 8*d.* per cent.

39. A playground is 100 ft. 9 in. long, and 40 ft. 6 in. wide. Required its area.—Ans. ( ) sq. yds. ( ) sq. ft. ( ) sq. in.

40. A block of stone is 4 ft. 3 in. long, 3 ft. 9 in. wide, and 2 ft. 10 in. deep. What is its solidity?—Ans. ( ) c. ft. ( ) c. in.

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## F.

1. Three hundred and five thousand six hundred and nine + twenty thousand and ninety-eight + seven hundred and sixty-five thousand eight hundred and seventy + thirteen thousand four hundred and sixty-eight + eight hundred and seventy-four thousand and seven + five hundred and ten + ninety thousand and eighty + five hundred and four thousand six hundred and seventy-six.

2. Find the difference between five million forty-seven thousand six hundred, and eighty million sixty thousand and ninety-one.

3. Multiply two million eight hundred and seventeen thousand nine hundred and eighty-nine by eleven; and the result by twelve.

4. Divide forty-eight million and forty-seven by four hundred and eighty-six.

5. Reduce five thousand eight hundred and twenty-four ounces of sugar to quarters.

6.

| *lbs.* | *oz.* | *dwt.* | *gr.* |
|---|---|---|---|
| 6 | 3 | 18 | 22 |
| 7 | 11 | 16 | 7 |
| 8 | 9 | 13 | 20 |
| 8 | 10 | 9 | 9 |
| 1 | 7 | 16 | 18 |
| 3 | 8 | 17 | 16 |
| 4 | 7 | 8 | 8 |
| 8 | 6 | 13 | 17 |
| 3 | 0 | 5 | 19 |

7.

| £ | *s.* | *d.* |
|---|---|---|
| 8427 | 15 | 0 |
| 7909 | 18 | $4\frac{1}{4}$ |

8.

| *E. ells.* | *qrs.* | *nls.* |
|---|---|---|
| 2 | 2 | 3 × 32 |

9.

| £ | *s.* | *d.* |
|---|---|---|
| 308410 | 18 | $0\frac{3}{4}$ ÷ 9 |

10. Reduce 16 qrs. 4 bus. 3 pks. 3 qts. 1 pt. to pints.

11. Resolve 33930 into its prime factors.

12. Find L. C. M. of 18, 30, 27, 5, 25.

13. Find G. C. M.; and reduce $\frac{10045}{7175}$ to lowest terms.

14. Bring $\frac{62859}{300}$ to a mixed number.

15. $\frac{5}{7} + \frac{4}{5} + \frac{4}{9} + 1\frac{4}{45} + 1\frac{6}{70} = ?$

16. Find the difference between $6\frac{1}{3}$ and $\frac{5}{6}$.

17. Reduce to a simple fraction $\frac{3}{5}$ of $\frac{4}{9}$.

18. What is the quotient of $1\frac{1}{18}\frac{7}{8}$ by $\frac{14}{39}$?

19. Express in positive terms $\frac{1}{18}\frac{3}{8}$ ton.

20. Reduce $\frac{1}{2}\frac{4}{1}$ pint to fraction of 1 gallon.

21. 2198 at 5*s.* $8\frac{1}{2}$*d.* (by Practice.)

## F.

22. Convert $1\frac{2}{3}\frac{0}{5}\frac{5}{6}$ into a decimal.

23. $635\cdot + 4\cdot38 + 18\cdot63725 + \cdot005 + \frac{1}{16} = ?$

24. From 48763·51 take 287·519634.

25. Multiply ·015365 by ·01536.

26. Divide 3·96 by ·02048.

27. Express in positive terms 4·328 tons.

28. What decimal of 3 reams is $13\frac{1}{3}$ sheets?

29. It cost 5 guineas to have 12 tons 6 cwt. 3 qr. carried 325 miles; what will be the expense of having 5 tons 5 cwt. 3 qr. carried the same distance?

30. If 16 acres of grass, averaging $2\frac{1}{2}$ tons per acre, were mown by 5 men in 4 days of 10 hours each, how many days will it take 4 men to mow 12 acres, averaging 3 tons per acre, working 9 hours a day?

31. Find the 12th power of 4.

32. Required the square root of 1296648081.

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33. Find the amount of £749 1*s.* 3*d.* for 14 years at 4 per cent.

34. Calculate the (true) discount on £1545 19*s.* 2*d.* from September 3rd to January 15th, at $4\frac{1}{2}$ per cent.

35. By selling a quantity of tobacco for £126 10*s.* 1*d.*, I find I have lost 3 per cent.; what had I given for it?

36. A rate of £328 6*s.* 8*d.* was levied from three parishes. The rental of No. 1 was £4325 10*s.*; of No. 2, £2689 17*s.* 6*d.*; and of No. 3, £1185 3*s.* 4*d.* What did each pay towards the rate?

37. Change 15708 roubles 10 copecs, Russian money, at 3*s.* $4\frac{1}{2}$*d.* per rouble, into British money (100 copecs = 1 rouble).

38. If the Three-and-a-half per Cents. were to fall to 70, and a person were to invest in them then, what rate per cent. would he get for his money?

39. The side of a square measures 398 yards; what is its area?—Ans. ( ) acre ( ) yards.

40. A chest is 5 ft. 4 in. long, 4 ft. 10 in. wide, and 3 ft. 7 in. deep; find its solidity.—Ans. ( ) cub. ft. ( ) cub. in.

## G.

1. Three hundred and six thousand four hundred and seventy-five + twenty-nine thousand + five hundred and sixteen thousand eight hundred and ninety-two + four thousand seven hundred and eighty-nine + eight hundred and nine thousand three hundred and forty-one + ninety-eight thousand and thirty + nine hundred thousand and four.

2. From forty million thirty thousand and twenty-seven, subtract seven million six hundred and twenty thousand nine hundred and fifty.

3. Multiply two million ninety-six thousand seven hundred and fifty-eight by three thousand and eighty-nine.

4. Divide six hundred and eighty-nine million seven hundred and fifty-one thousand eight hundred and seventy-nine by fifty-six (in two short divisions).

5. Reduce four thousand and eighty dwts. to lbs.

6.

| £ | s. | d. |
|---|---|---|
| 6237 | 17 | $9\frac{3}{4}$ |
| 984 | 8 | 7 |
| 827 | 19 | $11\frac{1}{2}$ |
| 638 | 14 | $10\frac{2}{4}$ |
| 8275 | 16 | $9\frac{1}{2}$ |
| 4108 | 17 | $7\frac{1}{4}$ |
| 989 | 16 | $8\frac{1}{4}$ |
| 727 | 18 | $10\frac{1}{4}$ |
| 8896 | 12 | $6\frac{3}{4}$ |
| 1073 | 15 | $9\frac{1}{2}$ |

7.

| £ | s. | d. |
|---|---|---|
| 380076 | 16 | $5\frac{1}{4}$ |
| 279096 | 17 | 11 |

8.

| lbs. | oz. | drs. | scr. | gr. | |
|---|---|---|---|---|---|
| 0 | 6 | 3 | 2 | 5 | × 84 |

9.

| qr. | bus. | pk. | gal. | qt. | pt. | |
|---|---|---|---|---|---|---|
| 539 | 1 | 2 | 1 | 1 | 1 | ÷ 45 |

10. Reduce 7417 inches to yards.—Ans. ( ) yds. ( ) qrs. ( ) nails ( ) in.

11. Resolve 6171 into its prime factors.

12. Find L. C. M. of 42, 18, 28, 20, 16, 35.

13. Find G. C. M.; and reduce $\frac{36}{1624162}$ to lowest terms.

14. What is $5\frac{5}{5}$ equal to? Write down 4 sevens in such a way that they shall be equal to 78.

15. Find the sum of $\frac{3}{14}$, $\frac{12}{35}$, $6\frac{1}{2}$, $\frac{4}{9}$, 3, and $\frac{121}{210}$.

16. From $4\frac{3}{15}$ subtract $\frac{7}{10}$.

17. Reduce to a simple fraction $1\frac{4}{5}$ of $1\frac{2}{3}$ of $1\frac{1}{9}$.

18. Let $6\frac{1}{2}$ be divided by $2\frac{4}{5}$.

19. Express in positive terms $\frac{4}{7}$ of 3 miles.

20. What part of a guinea is £$1\frac{4}{15}$?

21. 849 at 7*s.* 9½*d.* (by Practice.)

## G.

22. Convert ·009375 into a vulgar fraction.

23. $\cdot0356 + \frac{1}{125} + 2\frac{1}{64} + 2\cdot741825 + \frac{3}{320} + \cdot064575 = ?$

24. From 5·732968 subtract $4\frac{7}{16}$.

25. Multiply 386·71875 by ·01024.

26. Divide 3955·8 by ·057.

27. 6·435125 mile = ( ) m. ( ) f. ( ) pl. ( ) yd. ( ) ft. ( ) in.

28. Express $6\frac{3}{4}d.$ as a decimal of a sovereign.

29. What must a man earn per annum, if he spends 86 guineas every 56 days, and saves 100 guineas every year?

30. What length of trench, 10 feet wide and 1 yard deep, will 6 men dig in 6 days of 8 hours each; when 8 men, in 5 days of 9 hours each, dug a trench 120 yards long, 12 ft. wide, and 5 ft. deep?

31. Involve 3 to the 18th power (exhibiting the work).

32. Extract the square root of ·144, correct to 5 places.

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33. In how many years would £314 12*s.* 11*d.* amount to £456 4*s.* $8\frac{3}{4}d.$, reckoning interest at 5 per cent.?

34. If a man is willing to pay me a bill of £24 16*s.* a year before it is legally due, what sum shall I receive, allowing (true) discount at $5\frac{1}{2}$ per cent.?

35. A chest of tea, containing 113 lbs., was sold at 7*s.* 10*d.* per lb.; what was the gain per cent., the first cost having been £37 10*s.*?

36. Four graziers rent a pasture together for £110. A puts in 12 oxen, and keeps them there 5 weeks; B, 10 oxen for 6 weeks; C, 13 oxen for 4 weeks; and D, 8 oxen for 6 weeks. What must each pay towards the rent?

37. How much brandy, worth 28*s.* per gallon, must be taken in exchange for 219 tons, 16 cwt. 3 qrs. of guano, at £11 7*s.* 6*d.* per ton?

38. If I lay out £4850 in Four per Cent. Stock, at 97, how much will it bring me in per annum?

39. The side of a square room measures 16 ft. 6 in. How much carpet, one yard wide, will be required for it?—Ans. ( ) yards.

40. A box is 1 ft. 3 in. long, 11 in. deep, and 13 in. wide; how many gallons (277·27 cub. in.) will it hold? Also what would it cost to cover its 6 sides with gold leaf, at $\frac{3}{4}d.$ per square inch?

---

## H.

1. Eight million sixty thousand five hundred and ninety + seventy million seven hundred and fifty-eight thousand and eight + four hundred and twenty-eight thousand three hundred + three hundred and eighty-five million four hundred and seventy-nine + forty million forty thousand and forty + six hundred and eighty-nine million three hundred and fifty-seven thousand nine hundred + one million and one + eight million six hundred and fifty-eight thousand and seventy-three.

2. From one hundred million one hundred and five thousand three hundred and six, take nine million five hundred and eighty thousand and ninety-eight.

3. Multiply seventy-nine million three hundred and sixty-six thousand five hundred and forty-three by seven hundred and eighty.

4. Divide two hundred and fifty-seven million four hundred and eighty-six thousand nine hundred and sixty-eight, by three hundred and eighty-five.

5. Reduce two hundred and eighty-eight furlongs to feet.

6.

| *oz.* | *dr.* | *scr.* | *gr.* |
|---|---|---|---|
| 6 | 5 | 2 | 18 |
| 7 | 4 | 0 | 15 |
| 3 | 7 | 1 | 0 |
| 5 | 6 | 2 | 2 |
| 4 | 0 | 2 | 17 |
| 0 | 3 | 0 | 9 |
| 5 | 4 | 0 | 12 |
| 6 | 0 | 1 | 16 |
| 5 | 0 | 0 | 8 |

7.

| *cwt.* | *lb.* | *oz.* | *dr.* |
|---|---|---|---|
| 103 | 100 | 14 | 0 |
| 8 | 76 | 0 | 12 |

8.

| *m.* | *f.* | *pl.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 4 | 6 | 28 | 1 | 0 | 10 × 17 |

9.

| £ | *s.* | *d.* |
|---|---|---|
| 69114 | 8 | 3 ÷ 56 (in factors) |

10. Reduce 3 ac. 3 r. 38 pol. 27½ yds into square feet.
11. Resolve 336000 into its prime factors.
12. Find L. C. M. of 44, 6, 15, 132, 21.
13. Is the fraction $\frac{18}{91}\frac{28}{65}$ in its lowest terms?
14. Reduce $6\frac{87}{35}$ to an improper fraction.
15. Add together $11\frac{3}{5}$, $9\frac{1}{2}$, $7\frac{3}{8}$, $8\frac{7}{12}$, $9\frac{21}{40}$.
16. Subtract $\frac{61}{81}$ from $\frac{4}{7}\frac{1}{4}$.
17. Multiply $1\frac{11}{24}\frac{2}{19}$ by $57\frac{4}{5}$.
18. Divide 314 by $7\frac{5}{6}$.
19. Find value of $\frac{3}{5}$ of $\frac{4}{15}$ lb. Troy.
20. Reduce $\frac{2}{401}$ week to fraction of one hour.
21. 365 at 14*s.* 6*d.* (by Practice.)

## H.

22. Change $\frac{7}{250}$ into a decimal fraction.

23. $7{\cdot}065 + 28{\cdot} + 3\frac{13}{500} + {\cdot}083\frac{3}{4} + 3\frac{7}{320} = ?$

24. From $638{\cdot}072593$ take $84\frac{283}{3200}$.

25. Find the product of ·1625 and ·1148 of 8·63.

26. Divide 29406·3 by ·00798.

27. 6·3785 acres = ( ) ac. ( ) r. ( ) pl. ( ) yd. ( ) ft. ( ) in. ?

28. Reduce 5 pl. $2\frac{3}{4}$ yds. to decimal of 2 miles.

29. What price must wheat be per quarter, when 16 pks. 1 gall. cost me £1 2*s*. ?

30. An iron beam weighed 80 cwt. 20 lb., and was 18 ft. long, 11 in. thick, and 15 in. broad. How long is another beam of similar iron, 13 in. thick and 13 in. broad, that weighs 24 cwt. 12 lbs. ?

31. Raise 2 to its 35th power (exhibiting the work).

32. Find to 6 places the square root of ·38125.

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33. At what rate per cent. would £1258 11*s*. 8*d*. amount to £1478 16*s*. $8\frac{1}{2}$*d*. in $3\frac{1}{2}$ years ?

34. Required the present worth of a bill of £238 12*s*., due at the end of 5 months, at $3\frac{1}{2}$ per cent.

35. Bought a piece of linen, containing 36 yards, at the rate of 3*s*. $1\frac{1}{2}$*d*. per yard. What must I charge for the whole piece to gain 16 per cent. ?

36. Divide 5*s*. 3*d*. into 4 shares; in the proportion of 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$.

37. Change £795 sterling into Viennese money, at 4*s*. 7*d*. per rix dollar (90 creutzers = 1 rix dollar).—Ans. ( ) r. dol. ( ) creut.

38. If I lay out £5200 in Three per Cent. Stock, at 78, what income shall I derive from it ?

39. If the carpet in (G) be 5 quarters wide, how many yards will be required then ?

40. What is the weight (in cwts.) of a block of Parian marble, whose length is 4 ft., depth 3 ft. 6 in., and width 2 ft. 8 in.; a cubic foot of the stone weighing 180 lbs. ?

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# I.

1. Forty-nine million three hundred thousand eight hundred and seventy-six + three hundred and twenty-eight million seventy thousand four hundred and forty-eight + nine million four hundred and seventeen thousand and ninety + eight hundred and sixty-nine million five hundred and seventy-seven + sixty million sixty thousand and sixty + four hundred thousand and four + three hundred and eighty-nine thousand nine hundred.

2. Find the difference between sixty-eight thousand and seventy-five million three hundred, and three thousand nine hundred and four million one hundred and three thousand nine hundred and four.

3. Multiply fifty-tree million four hundred and sixteen thousand three hundred and forty-eight by ten thousand nine hundred.

4. Divide forty thousand five hundred and thirty-one million two hundred and sixty-one thousand, by five thousand nine hundred and sixty.

5. Reduce eight million three hundred and eighty-eight thousand six hundred and eight quarts of corn to quarters.

6.

| *guineas.* | *s.* | *d.* |
|---|---|---|
| 246 | 12 | $10\frac{3}{4}$ |
| 7 | 18 | $9\frac{1}{2}$ |
| 38 | 16 | 8 |
| 45 | 9 | $4\frac{1}{4}$ |
| 37 | 15 | $7\frac{1}{2}$ |
| 6 | 19 | $6\frac{3}{4}$ |
| 194 | 17 | $9\frac{1}{2}$ |
| 89 | 8 | $6\frac{3}{4}$ |
| 79 | 15 | $5\frac{1}{2}$ |
| 38 | 16 | $8\frac{1}{4}$ |

7.

| *lbs.* | *oz.* | *drs.* | *scr.* | *grs.* |
|---|---|---|---|---|
| 6 | 0 | 0 | 0 | 0 |
| 5 | 3 | 1 | 2 | 18 |

8.

$6s.\ 8\frac{3}{4}d. \times 129$

9.

| *yds.* | *qr.* | *nl.* | *in.* |
|---|---|---|---|
| 54 | 0 | 1 | $1\frac{1}{2} \div 7$ |

10. Reduce 6 mil. 37 pol. $4\frac{1}{2}$ yds. into feet.

11. Resolve 119280 into its prime factors.

12. Find L. C. M. of 24, 27, 32, 9, 40.

13. Find G. C. M., and reduce $\frac{15737}{146641}$ to lowest terms.

14. Reduce $\frac{432737}{89707}$ to a mixed number. [$998\frac{1}{2} = ?$

15. $6571\frac{3}{8} + 8419\frac{1}{4} + 6872\frac{5}{6} + 9843\frac{2}{3} + 789\frac{11}{12} +$

16. $1038614\frac{5}{16} - 38724\frac{7}{15} = ?$

17. Multiply $1\frac{4}{5}$ by $\frac{7}{3}$ of $1\frac{1}{9}$.

18. Divide $\frac{3}{5}$ of $\frac{10}{13}$ by $\frac{5}{26}$.

19. Express in positive terms $3\frac{1}{9}$ of 1 lb. Avoir.

20. Reduce $\frac{1}{54}$ of 18 lbs. to fraction of 2 cwt.

21. 289 at $17s.\ 1\frac{1}{2}d.$ (by Practice.)

## I.

22. Change ·400390625 into a vulgar fraction.
23. $\frac{9}{12\frac{1}{2}80} + \cdot0587 + \frac{29}{32} + 2\cdot64873875 + 7\frac{3}{50} = ?$
24. From $687\frac{1}{12}\frac{9}{5}$ take 679·0875.
25. ·1562 × ·093 × ·735 = ?
26. Divide 3·96 by 386·71875.
27. Express in positive terms 45·325 weeks.
28. What decimal of a pound is 9 scr. 12 gr. ?
29. How much land can be rented for £69 19*s*. 8*d*., if the rent of 2 ac. 1 r. 12 pol. is £6 3*s*. 6*d*. ?
30. How many sacks of flour will support 250 men during a siege of 21 days, when in ordinary times 56 sacks will support 350 men for forty days; supposing that during the siege the men's rations are reduced $\frac{2}{5}$ ?
31. Find the fifth power of 1·05.
32. Extract, to 5 places, the square root of 2·2; also find the cube root of 201230056.

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33. Find the interest of £356 13*s*. 4*d*. for 9 years at 4 per cent.
34. Required the discount on a bill of £1299 6*s*. 8*d*. due on July 12th, paid on April 19th, reckoning $5\frac{1}{2}$ per cent.
35. Paid £550 10*s*. for goods, and sold them for £605 11*s*.; what was the gain per cent. ?
36. In gunpowder, for every 6 drams of saltpetre, there is one each of brimstone and of charcoal; how much of each ingredient must be taken to make 5 cwt. of powder ?—Ans. ( ) cwt. ( ) qr. ( ) lb.
37. Change 13640 ducats 6 carlins 7 grains into British money, at $41\frac{1}{2}$*d*. per ducat (10 grs. = 1 carl., and 10 carl. = 1 ducat, Neapolitan money).
38. How much more profitable would it be to invest £2303 2*s*. 6*d*. in Three-and-a-half per Cent. Stock at $92\frac{1}{8}$, than in the Three per Cents. at 86, in point of income ?
39. A rectangular field contains 5 acres. One side is $302\frac{1}{2}$ yards long; how long is the other ?
40. A canal is 300 yards long; its breadth is 5 yds. 1 ft.; and it has an average depth of 5 ft. What weight of water does it contain, a cubic foot of water weighing 62·5 lbs. ?—Ans. ( ) tons ( ) cwt. ( ) qrs. ( ) lbs.

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## J.

1. Three hundred and seventy four million eight hundred and ninety-eight + seven million three hundred and twenty-nine thousand + seventy-nine million forty-seven thousand + eight hundred and sixty-nine thousand + five million and eighty-seven + four hundred million six hundred and eighty-three thousand nine hundred and ten + four million three hundred and ninety-seven thousand and ninety.

2. From sixty-eight thousand and seventy-five million three hundred subtract three thousand nine hundred and four million one hundred and three thousand nine hundred and four.

3. Multiply eight million eight hundred and seventy-seven thousand six hundred and sixty-five by one hundred and ninety-eight thousand and seventy.

4. Divide two thousand seven hundred and seventy-eight million six hundred and twenty thousand two hundred and twenty-five by seventy-seven (in factors).

5. Reduce fifty-four thousand seven hundred and twenty lbs. to scruples.

6.

| *sovs.* | *crowns.* | *pence.* |
|---|---|---|
| 3 | 3 | 52 |
| 7 | 2 | 48 |
| 6 | 5 | 19 |
| 4 | 8 | 17 |
| 3 | 5 | 42 |
| 7 | 8 | 38 |
| 6 | 2 | 48 |
| 4 | 0 | 27 |
| 6 | 3 | 59 |
| 17 | 3 | 40 |

7.

| *ac.* | *r.* | *p.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 13 | 3 | 28 | $17\frac{3}{4}$ | 7 | 39 |
| 6 | 3 | 29 | $27\frac{1}{2}$ | 8 | 48 |

8.

£47 10*s.* $8\frac{1}{6}$*d.* × 329

9.

| *wks.* | *dys.* | *hrs.* | *min.* | *sec.* |
|---|---|---|---|---|
| 231 | 1 | 18 | 44 | 6 ÷ 9 |

10. Reduce 558732 E. ells into yards.

11. Resolve 159201 into its prime factors.

12. Find L. C. M. of 48, 20, 30, 34, 51, 24. [terms.

13. Find G. C. M.; and reduce $\frac{9\,1\,5\,8\,4}{3\,4\,5\,6\,0\,0}$ to its lowest

14. Reduce 175 to a fraction which shall have 8 for its

15. Find the sum of $\frac{17}{48}$, $\frac{19}{64}$, $\frac{13}{36}$, $\frac{17}{32}$, $1\frac{3}{16}$, $\frac{7}{12}$. [denom.

16. From 10095 subtract $98\frac{2\,2\,4}{3\,1\,5}$.

17. $3\frac{1}{2} \times \frac{5}{14} \times \frac{8}{15} \times 6\frac{2}{3} = ?$

18. $(\frac{3}{5} + \frac{2}{7}) \div 2\frac{1}{2}$ of $\frac{4}{35}$.

19. Express, in positive terms, $\frac{14}{15}$ of $\frac{20}{21}$ of 3 quarters of

20. Reduce $\frac{19}{67\frac{1}{2}0}$ ton to fraction of 1 lb. [corn.

21. 418 at £7 6*s.* $5\frac{1}{2}$*d.* (by Practice.)

## J.

22. Change $84\frac{3}{32}$ into a decimal.

23. ·6 + ·175 + ·055 + ·95 = ? (and prove by vulgar

24. Subtract ·00093455 from $\frac{1}{3200}$. [fractions.)

25. 937·518 × ·146 × ·03 = ?

26. Divide 2·772 by 143·36.

27. Express in positive terms 3·1225 of 1 E. ell.

28. Reduce $\frac{3\frac{3}{4}}{8}$ of 4 lbs. to decimal of 2 lbs. 4 oz. Avoir.

29. If £30 3*s.* 9*d.* will purchase 16 cwt. 2 qr. 12 lb. of sugar, how much sugar shall I get for £17 2*s.* $1\frac{1}{2}$*d.*?

30. It took 4 men (working 9 hours a day) 5 days to mow a meadow of 12 acres, the crop being 3 tons per acre. It also took 5 men 8 days of 10 hours each to mow another field of 16 acres. How many tons an acre did the crop average in the latter case?

31. Raise $\frac{3}{5}$ to the seventh power.

32. Find the square root of ·3 to 5 places; also calculate the cube root of 193100552.

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33. At what rate per cent. will £178 6*s.* 8*d.* amount to £210 8*s.* 8*d.* in $4\frac{1}{2}$ years?

34. What sum will a man have to pay on June 11th for a debt of £2943 3*s.* 4*d.* legally due on August 9th, reckoning discount at 6 per cent.?

35. By selling 8 qrs. 3 bus. of wheat for £20 2*s.* I find I have lost 2*s.* per quarter; how much is the loss per cent.?

36. A and B enter into partnership. A brings into the business 179 cwt. 3 qr. 25 lb. of sugar at £3 13*s.* 3*d.* per cwt.; B 212 cwt. 3 qr. 19 lb. of rice worth £1 13*s.* 2*d.* per cwt. Besides this they each contributed £100. When they have gained £400, they dissolve partnership; required to know each man's share of the profits.

37. If in exchange for 246 cwt. 3 qr. 24 lb. of pearlashes at £3 5*s.* 4*d.* per cwt. I give 302 qrs. 4 bush. 1 pk. of oats, what do I value my oats at per peck?

38. If £2810 stock is sold out of the Three per Cents., when the price is quoted at 95; how much ready money will it produce?

39. What length must be cut off from a plank 1 ft. 10 in. wide, so that the piece sawn off may contain exactly 11 square feet?

40. A specimen block of coal is 5 ft. 4 in. in height, 4 ft. 6 in. in width, and 44 in. long. What is its weight; supposing one cubic foot to weigh 84 lbs.?

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## K.

1. Six thousand and eighty million four hundred and nine thousand and seventy + ten million ten thousand and ten + three hundred and sixty-nine thousand and eight + two hundred and thirteen million six hundred thousand seven hundred and forty-three + seven thousand million seven thousand + eight hundred million and ninety + thirty-six million two hundred and eighty-four thousand + seven thousand seven hundred and eighteen.

2. From ten thousand and six million three hundred and seventy thousand two hundred and fifty-seven, subtract ninety-eight million sixty thousand six hundred and seventeen.

3. Multiply forty-three million seven hundred and eighteen thousand by twenty thousand seven hundred (exhibit the work).

4. Divide seven thousand million eight hundred and ninety thousand six hundred and seventy-four by twenty-nine thousand nine hundred (exhibit the work).

5. How many minutes in two weeks?

6.

| *E.* | *ells.* | *qrs.* | *nls.* | *in.* |
|---|---|---|---|---|
| 3 | 3 | 3 | 1 | 1/2 |
| 4 | 4 | 0 | 2 | |
| 3 | 4 | 1 | 1 | 3/4 |
| 6 | 3 | 2 | 2 | |
| 5 | 2 | 3 | 0 | 3/4 |
| 8 | 1 | 1 | 2 | |
| 6 | 0 | 3 | 1 | 1/2 |
| 7 | 4 | 3 | 1 | |
| 5 | 3 | 2 | 1 | 1/2 |
| 3 | 1 | 0 | 0 | |

7.

| *qrs.* | *bus.* | *pks.* | *gal.* | *qts.* | *pts.* |
|---|---|---|---|---|---|
| 3 | 6 | 3 | 0 | 2 | 0 |
| 2 | 6 | 3 | 1 | 3 | 1 |

8.

£7 14*s.* 8*d*. × 37.

9.

| *tons.* | *cwt.* | *qrs.* | *lbs.* | *oz.* | *drs.* | |
|---|---|---|---|---|---|---|
| 51 | 7 | 0 | 14 | 13 | 0 | ÷ 16 |

10. Reduce 24 lbs. 8 oz. 18 grs. into grains.

---

11. Write down all the prime numbers from 0 to 60. How many?
12. Find L. C. M. of 15, 25, 35, 42, 40, 7, 18.
13. Is the fraction $\frac{55}{45}\frac{53}{81}$ in its lowest terms.
14. Reduce $1936\frac{45}{200}\frac{1}{2}$ to an improper fraction.
15. $634\frac{1}{40} + 239\frac{7}{24} + 868\frac{5}{16} + 482\frac{11}{30} = ?$
16. $\frac{3}{5} - \frac{2}{9} + \frac{4}{21} + \frac{8}{35} - \frac{28}{63} = ?$
17. Find the continued product of $\frac{63}{121}$, $5\frac{1}{5}$, $1\frac{8}{91}$.
18. Reduce to a simple fraction $\frac{\frac{1}{2} - \frac{1}{3}}{\frac{3}{4} + \frac{1}{3}}$.
19. Express in positive terms $\frac{4}{15}$ of 365 days 6 hrs.
20. What fraction of 21 c. yds. 12 c. ft. is 24 c. ft.
21. 837 at £12 14*s*. 8*d*. (by Practice.) [216 in.?

---

## K.

22. Find a vulgar fraction equivalent to ·65625.
23. ·075 + 2·625 + ·0625 + 2·8 = ? prove by vulgar fractions.
24. ·28125 − ·00625 = ? prove by vulgar fractions.
25. Find the product of 1·3825 and ·5128.
26. ·043002 ÷ 540· = ?
27. Find the value of 3·265 of £4 10*s.*
28. Express ·0$\dot{6}$ of 1 day 9 hrs. as a decimal of 1 week.
29. A tradesman fails for £4458, but was able to pay his creditors 18*s.* 8*d.* in the pound. What was his estate worth?
30. When wine is £40 a pipe, it is found that £14 is sufficient for a family of 8 persons during 36 weeks. How many pounds worth will suffice 30 persons a whole year, wine being £60 a pipe?
31. Raise 1·01 to the 4th power.
32. Extract the cube root of 19814511816, and find the square root of ·7$\dot{8}\dot{9}$ to 5 places.

---

33. What principal put out to interest, at 4 per cent., will in 3½ years furnish £104 17*s.* 4½*d.* interest?
34. Required the discount on a bill of £1948, drawn Nov. 9, at 9 months; discounted April 19, at 5½ per cent. (allowing 3 days' grace.)
35. If 15 per cent. be gained by selling molasses at 50*s.* per cwt., how much will be gained per cent. by selling them at £2 5*s.* 6*d.* per cwt.?
36. In chalk 28 grains of lime are always found combined with 22 grains of carbonic acid. But lime itself is a compound, containing 20 grains of calcium to 8 grains of oxygen; also carbonic acid consists of carbon and oxygen, in the respective proportions of 6 and 16. Calculate the weight of all the oxygen in 10 lbs. of chalk.
37. Change 4935 piastres 7 reals 20 maravedis, Spanish money, at 3*s.* 3½*d.* per piastre, into British money (34 m. = 1 rl. and 8 rl. = 1 piast.).
38. If I transfer £768 Stock from the Four per Cents. when they are at 96, to the Three-and-a-half per Cents. at 84, how much of the latter Stock do I obtain?
39. A room is 17 ft. 8 in. long, 13 ft. 10 in. high, and 12 ft. 4 in. wide. Required the area of its 4 side-walls.—Ans. in yards.
40. A block of stone, 5 ft. 7 in. wide, and 3 ft. 9 in. deep, is estimated to contain 5 cub. yd. 16 ft. 1377 in. How long is it?

# L.

1. Five thousand and six million eight hundred + ninety-eight million and ten + eight hundred and ninety-seven thousand and seventeen + eighty thousand and six million eighty thousand and six + twelve million five hundred and ninety-four thousand and seventy-one + three thousand four hundred and seventy-five + three hundred and sixty thousand nine hundred + eighteen million and one.

2. From two hundred and five million three hundred and sixty thousand and seventy-four, subtract one hundred and ninety-five million four hundred thousand nine hundred and eighty.

3. Multiply eighty-nine million seven hundred and sixty-five thousand four hundred and thirty-nine by twenty thousand and ninety-eight.

4. Divide seven hundred thousand and seventy million seven thousand by eight million six hundred thousand (exhibiting the work).

5. In one hundred and twenty bars of gold, each weighing four thousand three hundred and twenty dwts., how many lbs. are there?

6.

| *bus.* | *pks.* | *gal.* | *qts.* | *pts.* |
|---|---|---|---|---|
| 3 | 3 | 0 | 3 | 1 |
| 4 | 2 | 1 | 0 | 0 |
| 6 | 2 | 1 | 0 | 1 |
| 5 | 2 | 1 | 3 | 1 |
| 8 | 3 | 0 | 2 | 1 |
| 7 | 0 | 0 | 3 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 4 | 1 | 0 | 1 | 0 |
| 3 | 1 | 1 | 1 | 1 |
| 6 | 3 | 0 | 0 | 1 |
| 5 | 2 | 1 | 2 | 0 |

7.

| *mil.* | *fur.* | *pol.* | *yds.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 62 | 7 | 28 | 3 | 2 | 1 |
| 38 | 3 | 29 | $4\frac{1}{2}$ | 2 | 11 |

8.

| *tons.* | *cwt.* | *qr.* | *lb.* | *oz.* | *dr.* | |
|---|---|---|---|---|---|---|
| 3 | 4 | 0 | 21 | 14 | 13 | × 8 |

9.

| £ | *s.* | *d.* | |
|---|---|---|---|
| 15638 | 16 | $2\frac{1}{4}$ | ÷ 2303 |

10. Reduce £698758 12*s.* 6*d.* to half-crowns (leave the work).

11. Resolve 1213030 into its prime factors.
12. Find the lowest integer that contains 16, 15, 14, 12.
13. Find G. C. M., and reduce $\frac{5632}{568320}$ to lowest terms.
14. Reduce $\frac{32372730}{897}$ to a whole or mixed number.
15. Add together $\frac{19}{42}$, $\frac{2}{3}$, $\frac{29}{42}$, $\frac{6}{7}$, $\frac{59}{63}$, $\frac{11}{14}$.
16. $3\frac{1}{2} + 5\frac{1}{3} - 2\frac{3}{8} - 4\frac{5}{9} + 6\frac{7}{12} - 3 = ?$
17. Multiply $1\frac{5}{21}$ of $4\frac{21}{25}$ by $\frac{10}{39}$ of $\frac{28}{99}$.
18. Reduce to a simple fraction $\dfrac{\frac{1}{12} + \frac{3}{5} + \frac{7}{20}}{\frac{5}{7} + \frac{3}{10}}$.
19. Express in positive terms $\frac{5}{21}$ of 3 E. ells.
20. Reduce 3 a. 1 r. $13\frac{1}{3}$ pol. to fraction of 1 square mile.
21. 199 at £7 12*s.* 6*d.* (by Practice.)

## L.

22. Reduce $5\frac{19}{21}$ to a decimal.

23. $8{\cdot}5\dot{6} + 7{\cdot}40\dot{8} + {\cdot}5\dot{8}6\dot{2} = ?$

24. From ·0390625 take ·0270625, and prove by vulgar fractions.

25. $\cdot11 \times \cdot11 \times \cdot025 = ?$

26. Divide 9802·1 by ·0798.

27. Express in positive terms 1·0125 of $5\frac{1}{2}$ tons.

28. Reduce 3 dwt. 12 grs. to decimal of 3 lbs.

29. Wheat being £2 2*s.* 8*d.* per quarter, what shall I have to pay for 2 bus. 2 qts. ?

30. If 2 engines of 12 horse power pump up 3200 gallons of water from a pit 75 fathoms deep in 45 minutes, how long would the same engines be in pumping 4000 gallons from a mean depth of 50 fathoms.

31. Raise ·008 to the fifth power.

32. Extract the square root of ·8958958.... to 6 places; and find the cube root of 526926752533.

---

33. What will £1120 8*s.* amount to in $6\frac{1}{4}$ years at $5\frac{1}{2}$ per cent. ?

34. Required the discount on £485 9*s.* 2*d.* due 19 months hence at $4\frac{3}{4}$ per cent.

35. If by selling butter at £5 12*s.* per cwt. 5 per cent. is gained, what will be the gain per cent. if I sell it at 16*d.* per lb. ?

36. A and B began business together with capitals of £200 and £300 respectively; at the end of 3 months they admit C as a partner with £500; and 2 months after that D enters the concern with a capital of £500. After 12 months their gains are found to be £800. How must this sum be apportioned (exact answer) ?

37. How much silver at 5*s.* $9\frac{1}{4}$*d.* per oz. ought to be given in exchange for 159 cwt. 3 qr. 22 lb. of glue, at £2 12*s.* 6*d.* per cwt. ?—Ans. ( ) oz. ( ) dwt. ( ) gr.

38. How much income is gained by selling £3600 stock out of the Three per Cents. at 85, and buying with the proceeds Three-and-a-half per Cent. Stock, quoted at 96 ?

39. A box is 1 ft. 4 in. long, 11 in. wide, and 1 ft. 1 in. deep; what is the area of its 6 sides ?

40. A block of oak measures 19 in. by 16 in.; and is 1 ft. 11 in. long. Estimating that the wood weighs 54 lbs. per cubic foot, find the weight of the piece in lbs. ?

## M.

1. Fifty thousand and eight million four hundred thousand and forty + thirty-nine million forty-seven thousand three hundred + two million and eighty-nine + nine thousand million eight hundred and seventy thousand and eight + thirty-seven thousand three hundred and ninety-four million two hundred and seventeen + six hundred and ninety-eight thousand + four thousand and two million eighty thousand and ten + five million fifteen thousand.

2. From three hundred and sixty million seven hundred and ten thousand two hundred and ninety subtract three hundred and twenty million eight hundred and nineteen thousand nine hundred and one.

3. Multiply eight hundred and thirty-nine million six hundred and eighty-four thousand five hundred by seven hundred thousand eight hundred and seventy.

4. Divide seventeen thousand million by nineteen thousand six hundred and seventy-eight.

5. Reduce thirty-eight thousand four hundred and fifty [yards to E. ells.

6.

| *cwt.* | *qrs.* | *lbs.* |
|---|---|---|
| 76 | 3 | 20 |
| 84 | 2 | 18 |
| 59 | 0 | 19 |
| 68 | 3 | 8 |
| 95 | 2 | 17 |
| 87 | 2 | 14 |
| 66 | 3 | 23 |
| 59 | 1 | 16 |
| 45 | 2 | 9 |

7.

| *wks.* | *dys.* | *hrs.* | *min.* | *sec.* |
|---|---|---|---|---|
| 70 | 0 | 17 | 51 | 47 |
| 35 | 3 | 22 | 51 | 59 |

8.

6 *lbs.* 4 *oz.* 18 *dwt.* 21 *gr.* × 30

9.

| *m.* | *f.* | *pl.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 22 | 3 | 34 | 3 | 1 | 3 ÷ 7 |

10. Reduce 174 qrs. 3 pks. 3 qts. into pints.

11. Resolve 155727 into its prime factors.

12. Find the smallest integer that contains 6, $5\frac{1}{2}$, 4, $1\frac{1}{2}$.

13. Find G. C. M.; and reduce $\frac{70568}{42384}$ to its lowest terms.

14. Reduce 238 to a fraction with 13 for its denominator.

15. Find the sum of £$179\frac{2}{3}$, £$465\frac{2}{7}$ + £$388\frac{2}{5}$, £$16\frac{20}{21}$, and £$\frac{73}{105}$.

16. $238\frac{1}{5} + 796\frac{5}{8} - 184\frac{2}{3} - 587\frac{1}{2} + 145 = ?$

17. Multiply $\frac{11}{132}$ of $1\frac{23}{54}$ by $\frac{57}{28}$.

18. Reduce to a simple fraction $\dfrac{3\frac{11}{15} \div 2\frac{1}{12}}{5\frac{3}{5} \div 6\frac{1}{4}}$.

19. Express in positive terms $\frac{9}{11}$ of half an acre, in r., p., yd., ft., in.

20. What fraction of 9 quarters of barley is 5 bus. 1 gal.

21. 634 at £18 2*s.* 9$\frac{1}{2}$*d.* (by Practice.) [2 qts. 1 pt. ?

## M.

22. Reduce $\cdot i\dot{5}$ to its equivalent vulgar fraction.

23. $6\cdot3\dot{0}\dot{7} + \cdot583 + \cdot\dot{2}49\dot{8} + 18\cdot + \cdot316\dot{2}\dot{5} = ?$

24. From $15\cdot0\dot{3}\dot{8}$ subtract $5\cdot1\dot{7}\dot{9}$.

25. $\cdot5\dot{6} \times \cdot0\dot{2}\dot{7} = ?$

26. Divide $\cdot3\dot{6}\dot{0}$ by $3\frac{1}{3\dot{3}}$.

27. Find value of $5\cdot\dot{3}$ of £1·545.

28. Express half a cubic inch as a decimal of ·025 c. foot.

29. How much must a man, who has £159 12*s.* a year, spend in a fortnight, if he wishes to have 100 guineas saved at the year's end?

30. If two engines of 12 horse power can pump 3200 gallons of water from a mine 75 fathoms deep in 15 minutes, how many engines of 9 horse power will be required to raise 4000 gallons from a depth of 90 fathoms in 20 minutes?

31. Find the square of $1\frac{1}{4}$.

32. Find $\sqrt[3]{9\cdot\dot{6}}$ to three decimal places, and $\sqrt{\cdot\overline{48}\dot{9}}$ to 6 places.

---

33. What principal put out to interest for $3\frac{1}{8}$ years at $5\frac{1}{2}$ per cent. will gain £192 11*s.* $4\frac{1}{2}$*d.*?

34. Required the difference between the discount and the interest of £361 10*s.* for 140 days, reckoning 5 per cent.

35. At what price per cwt. must soap, which cost $5\frac{1}{4}$*d.* per lb., be sold, so as to lose only $13\frac{7}{11}$ per cent.?

36. A merchant fails for £1800. Of this sum he owes £250 to A; £360 10*s.* to B; £450 2*s.* 6*d.* to C; a like sum to D; and the rest to E. His goods are worth only £830. How must this sum be divided among the five creditors, allowing £200 for expenses?

37. Change £256 4*s.* $4\frac{1}{2}$*d.* into Portuguese money at $62\frac{3}{8}$*d.* per milree (1000 rees = 1 milree).—Ans. ( ) milrees ( ) rees.

38. How much money must I invest in the Three-and-a-half per Cents. at 84, to receive an income of £129 1*s.* 3*d.*?

39. A bath is 5 ft. 10 in. deep; 7 ft. 10 in. wide; and 12 ft. in length. What will be the expense of lining its sides and bottom with cement at $7\frac{1}{2}$*d.* per square yard?

40. How much in length must be sawn off from a log of mahogany, which is 14 in. deep, and 11 in. wide, so that the block cut off may contain $5\frac{1}{2}$ cubic feet?

## N.

1.

$$\begin{array}{r} 63487158\tfrac{1}{2} \\ 2914276\tfrac{3}{4} \\ 12587247 \\ 63912\tfrac{1}{4} \\ 8275988 \\ 4392689\tfrac{1}{2} \\ 15382996\tfrac{1}{4} \\ 94077 \\ 6324829\tfrac{3}{4} \\ 285143\tfrac{1}{2} \\ 69251428 \\ 2989436 \\ \hline\hline \end{array}$$

2.

$$\begin{array}{r} 1037146371450083\tfrac{3}{4} \\ 102980444193092 \\ \hline\hline \end{array}$$

3.

$$6897392416\tfrac{3}{4} \times 9$$

4.

$$32174286371\tfrac{1}{2} \div 3$$

5. Reduce three thousand and seventy-five seven-shilling pieces into crowns.

6.

| *qrs.* | *bus.* | *pks.* | *gal.* |
|---|---|---|---|
| 3 | 2 | 0 | $1\frac{1}{2}$ |
| 7 | 7 | 3 | 0 |
| 5 | 6 | 0 | $1\frac{1}{4}$ |
| 4 | 5 | 1 | 0 |
| 3 | 0 | 2 | 0 |
| 5 | 4 | 3 | $1\frac{1}{2}$ |
| 6 | 1 | 1 | 1 |
| 8 | 6 | 3 | $0\frac{1}{4}$ |
| 0 | 4 | 1 | $1\frac{1}{2}$ |

7.

| *ac.* | *r.* | *p.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 3 | 2 | 28 | $6\frac{3}{4}$ | 2 | 100 |
| 1 | 2 | 29 | $5\frac{1}{4}$ | 7 | 112 |

8.

| *E. ells.* | *qr.* | *nl.* | *in.* | |
|---|---|---|---|---|
| 64 | 4 | 3 | $1\frac{1}{2}$ | × 8 |

9.

| *mil.* | *yds.* | *in.* | |
|---|---|---|---|
| 3 | 1000 | 6 | ÷ 12 |

10. Reduce 48163097 guineas into sovereigns.

11. Write down all the prime numbers from 60 up to 100.

12. Find L. C. M. of the first 12 odd numbers.

13. Find G. C. M.; and reduce $\frac{1056}{220748}$ to its lowest terms.

14. Reduce $\frac{2956}{308}$ to a whole, or mixed number.

15. $\frac{14}{42} + \frac{28}{56} + \frac{27}{54} + \frac{77}{539} + \frac{32}{192} = ?$

16. $64\frac{3}{14} - 18\frac{7}{10} + 87\frac{6}{21} + 65\frac{2}{5} - 16\frac{13}{15} - 8\frac{19}{26} = ?$

17. Reduce to a simple fraction $(3\frac{1}{2} + 5\frac{2}{5}) \times (\frac{8}{11} - \frac{2}{5})$.

18. Divide the difference of $\frac{5}{12}$ and $\frac{3}{5}$ by the product of $1\frac{1}{2}$ and $\frac{5}{11}$.

19. Express in positive terms $\frac{5}{576}$ of 168 cubic yards.

20. What fraction of 2 oz. is 1 oz. 2 scr. 4 gr.?

21. 537 at £9 17*s.* 6*d.* (by Practice.)

## N.

22. Reduce $3\frac{3}{14}$ to an equivalent decimal.

23. $\cdot 3\dot{7}54\dot{3} + 61\cdot 483 + 3\cdot 1715\dot{6}\dot{3} + \cdot 2\dot{0}70\dot{5} = ?$

24. $100\cdot 89\dot{3}7625\dot{7} - 9\cdot 8\dot{4}6372\dot{1} = ?$

25. Multiply $\cdot 025\dot{8}$ by $\cdot 18\dot{3}$.

26. Divide $5\cdot\dot{3}$ by $17\frac{1}{15}$.

27. Express in positive terms $7\cdot 03\dot{6}$ of $3\frac{1}{12}$ miles.

28. What is $3\cdot 3\dot{6}$ shilling, when expressed as decimal of £1?

29. How much will it cost me to have 12 boxes, each weighing 3 cwt. 1 qr., carried 93 miles, if it cost £1 12*s*. 5*d*. to have them carried 127 miles?

30. If $\frac{3}{7}$ of a roll of carpet cost £$5\frac{4}{9}$, when the price was 3*s*. 4*d*. per yard, what would half the remainder cost, the price having been raised to $4\frac{2}{7}$*s*. per yard?

31. Find the third power of $2\frac{1}{5}$.

32. Calculate the square root of $1\frac{9}{16}$, and the cube root of $3\frac{3}{8}$.

---

33. In what time will £200 (or any other sum of money) double itself, if put out to interest at 4 per cent.?

34. What is the present worth of a bill of £500 2*s*. 6*d*., drawn March 15th, at 4 months, and discounted April 6th, at 4 per cent.?

35. How much sugar, which cost £3 6*s*. 8*d*. per cwt., must be sold to gain £100, if the selling price is at a gain of 21 per cent.?

36. Two men are employed together on the same field, A works steadily 9 hours a day, for a fortnight; B works 10 hours a day during the first week, but only 7 hours a day during the second. They received £11 1*s*. 8*d*. for the job. How must they share the money?

37. A has 190 yards of broad-cloth worth 16*s*. 6*d*. per yard, for which B gives him 3 bags of cotton, each containing 3 cwt. 2 qr. 8 lb. at $16\frac{1}{2}$*d*. per lb., and 151 gallons of rum. What did he reckon his rum worth per gallon?

38. The £10 shares of a railway company are at 8 above par. What shall I have to give for 25 such shares?

39. A square field contains 9 acres. How long is one of its sides?—Ans. in yards.

40. There are two cubes. One is 1 ft. 3 in. long, 1 ft. in depth, and 9 in. in width. The dimensions of the other are 10, 6, and 4 inches. How many times is the former larger than the latter?

---

## O.

1.

$$\begin{array}{r} 8716943\tfrac{1}{4} \\ 7831956\tfrac{1}{3} \\ 9978169\tfrac{1}{4} \\ 837988\tfrac{3}{4} \\ 2916741\tfrac{1}{3} \\ 989428\tfrac{1}{4} \\ 6715386\tfrac{1}{3} \\ 89998\tfrac{3}{4} \\ 987665\tfrac{1}{4} \\ 83799\tfrac{1}{3} \\ 89458 \\ 6594875\tfrac{3}{4} \\ \hline\hline \end{array}$$

2.

$$\begin{array}{r} 4003721687415 \\ 93940096087\tfrac{1}{4} \\ \hline\hline \end{array}$$

3.

$63821794698 \times 8\tfrac{1}{2}$

4.

$37165912387417 \div 5\tfrac{1}{2}$

5. In fourteen thousand four hundred grains how many [drams?

6.

| *tons.* | *cwt.* | *lbs.* |
|---|---|---|
| 63 | 18 | 94 |
| 75 | 16 | 82 |
| 84 | 9 | 49 |
| 35 | 19 | 108 |
| 63 | 12 | 85 |
| 9 | 17 | 79 |
| 68 | 15 | 67 |
| 49 | 5 | 36 |
| 52 | 17 | 69 |

7.

| *leag.* | *mil.* | *yds.* |
|---|---|---|
| 38 | 1 | 1029 |
| 30 | 2 | 1675 |

8.

£6 15*s.* $9\tfrac{3}{4}$*d.* $\times$ 329

9.

| *qr.* | *bus.* | *pk.* | *gal.* | *qt.* | *pt.* |
|---|---|---|---|---|---|
| 539 | 1 | 2 | 1 | 1 | 1 $\div$ 135 |

10. Reduce 41860755 square inches to poles.

11. Resolve 382789 into its prime factors.

12. Find L. C. M. of the first 12 even numbers.

13. Find G. C. M, and reduce $\frac{3861}{38838}$ to its lowest terms.

14. Reduce $500\frac{163}{28800}$ to an improper fraction.

15. $\frac{13}{42} + \frac{59}{65} + \frac{83}{121} + \frac{3}{70} + \frac{91}{110} + \frac{91}{264} = ?$

16. From £15 14*s.* $7\tfrac{1}{2}$*d.* subtract £6 19*s.* $8\tfrac{3}{5}$*d.*

17. $(4\frac{1}{3} + 3\frac{5}{6} - 2\frac{1}{3}) \times \frac{5}{8}$ of $\frac{4}{3\frac{1}{3}} = ?$

18. To the sum of $\frac{13}{27}$, $\frac{13}{36}$, and $\frac{2}{3}$, add the difference of $\frac{11}{6}$ and $\frac{10}{27}$, and divide the result by $3\frac{29}{72}$.

19. Find the value of $\frac{2}{3}$ of $\frac{1\frac{1}{2}}{6}$ of $28\frac{1}{2}$ guineas.

20. What part of £2 5*s.* is $6\frac{2}{7}$ of $2\frac{1}{3}$ half-crowns?

21. 384 at £4 3*s.* 8*d.* (by Practice.)

## O.

22. Reduce $\cdot\dot{2}9\dot{7}$ to its equivalent vulgar fraction.

23. $60{\cdot}4\dot{3}\dot{2} + {\cdot}617\dot{3}45\dot{0} + 3{\cdot}97 + {\cdot}06i7\dot{3} + 1{\cdot}\dot{7}35\dot{8} = ?$

24. $46{\cdot}5371 - 38{\cdot}1\dot{0}\dot{5} = ?$

25. Find the continued product of $\cdot23\dot{7}$, $\cdot1\dot{9}$, and $9{\cdot}9$.

26. Divide $\cdot1\dot{2}\dot{0}$ by $3\frac{1}{3\dot{3}}$.

27. 6·3125 of 3 bushels = ( ) qrs. ( ) bus. ( ) pks. ( ) gal. ( ) qts. ?

28. What decimal of 4 yards is 1 E. ell. 3 qrs. 3 nls. $1\frac{1}{4}$ inch?

29. When $7\frac{5}{4}$ cwt. of tobacco cost me $2\frac{3}{4}d.$ per lb., what will be the value of 51 cwt. 3 qr. $26\frac{1}{4}$ lb. (without duty)?

30. If on $\frac{3}{5}$ of a shilling loaf each per day 450 men can hold out for $8\frac{1}{3}$ weeks, how long could they hold out on an allowance of $\frac{7}{8}$ of a nine-penny loaf each?

31. Calculate the cube of $\cdot11$.

32. Find $\sqrt[3]{\frac{2}{3}}$, and $\sqrt{1\frac{2}{3}}$; each to 4 places.

---

33. Required the interest of £547 10*s.* for 4 yrs. 115 days at $4\frac{1}{2}$ per cent. (reckoning only 365 days in each year)?

34. If a person owes £20, due in 3 months; £20, due in 6 months; and £40 to be paid in 8 months; at what time may all these debts be justly discharged by a single payment?

35. A grocer bought 12 cwt. of molasses at $3\frac{1}{4}d.$ a lb., and sold the same so as to make a profit of 4 guineas. What was that profit per cent.?

36. A and B begin business together. A puts in £300 at first, and in 3 months' time £300 more. B at first put in only £300, but after 9 months he brought £1000 more into the concern. After trading 24 months, they find their profits to be £1500. How must they share this sum?

37. Change 685 dollars 45 cents into British money, at 4*s.* 6*d.* per dollar (100 cents = 1 dollar).

38. What income shall I derive, if I invest £380 in a telegraph company, which pays $4\frac{1}{2}$ per cent., the market price of the shares being quoted at 5 below par?

39. A square room is 18 ft. 9 in. long and 15 ft. in height; how many yards of paper, $1\frac{1}{4}$ yd. wide, will be required for it?

40. A cistern, in shape an exact cube, contains 112 cub. ft. 1576 inches. What is its depth? — Ans. ( ) ft. ( ) in.

---

# P.

1.

$$\begin{array}{r} 87612937\frac{3}{4} \\ 389429\frac{1}{2} \\ 6949198\frac{3}{4} \\ 98976\frac{1}{2} \\ 876588\frac{1}{4} \\ 39945863\frac{3}{4} \\ 8421629\frac{1}{2} \\ 79440056\frac{1}{4} \\ 830725\frac{1}{2} \\ 8997644\frac{3}{4} \\ 831796\frac{1}{2} \\ 98789468\frac{1}{4} \\ \hline \end{array}$$

2.

$$\begin{array}{r} 1000386210075307\frac{1}{4} \\ 9870500980108\frac{3}{4} \\ \hline \end{array}$$

3.

$7629148362587 \times 97\frac{1}{4}$

4.

$3219862005317 \div 11\frac{3}{4}$

5. Reduce six hundred and fifty-two million two hundred and eighty-eight thousand lbs. to tons.

6.

| *m.* | *f.* | *pol.* | *yds.* |
|---|---|---|---|
| 3 | 7 | 21 | $3\frac{1}{2}$ |
| 4 | 0 | 28 | 5 |
| 6 | 4 | 19 | $4\frac{1}{4}$ |
| 17 | 5 | 8 | $1\frac{3}{4}$ |
| 4 | 6 | 17 | 3 |
| 8 | 4 | 15 | 4 |
| 6 | 1 | 16 | $2\frac{1}{2}$ |
| 9 | 5 | 29 | 4 |
| 13 | 5 | 18 | $0\frac{3}{4}$ |

7.

| *sq. miles.* | *acres.* | *yds.* |
|---|---|---|
| 5 | 382 | 790 |
| 3 | 498 | 909 |

8.

| *a.* | *r.* | *p.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 3 | 2 | 28 | $24\frac{1}{2}$ | 7 | $100 \times 8$ |

9.

£86 16*s.* $1\frac{1}{2}$*d.* $\div$ 129

10. Reduce 8993196 drams to tons.

11. Resolve 1004663 into its prime factors.

12. Find L. C. M. of a sov., guin., crown, half-crown, and a 7*s.* piece.

13. Find G. C. M., and reduce $\frac{216600}{224903}$ to its lowest terms.

14. Reduce $5\frac{3}{5}$ to an improper fraction, with 20 for denom.

15. 2 sc. $17\frac{1}{2}$ gr. + 3 sc. $16\frac{1}{3}$ grs. + $68\frac{1}{4}$ grs. + 3 sc. $0\frac{1}{5}$ gr. + $41\frac{5}{6}$ gr. = dr. sc. gr.?

16. Subtract 25 a. 3 r. $37\frac{5}{6}$ pol. from 40 a. 3 r. $29\frac{3}{4}$ pol.

17. Reduce to a simple fraction $2\frac{3}{4}$ $(\frac{1}{2} - \frac{3}{11})$.

18. Multiply the sum of $\frac{3}{8}$ and $\frac{5}{6}$ by their difference, and divide the result by $2\frac{1}{5}$ times their product.

19. Express in positive terms $\frac{3\frac{1}{2}}{5\frac{1}{4}}$ of $\frac{9}{14}$ of 18 tons.

20. Reduce 7 lbs. 5 dwt. to fraction of 40 lbs. 6 oz. 20 grs.

21. 6 reams 13 quir. 8 sh. of paper at £1 7*s.* 10*d.* per ream (by Practice).

## P.

22. Reduce $84\frac{11}{330}$ to a decimal.

23. $83{\cdot}4\dot{3}76\dot{0} + 536{\cdot}\dot{5} + {\cdot}0\dot{1}0\dot{5} + {\cdot}0\dot{0}10\dot{5} + 624{\cdot}319\dot{8}\dot{5} +$

24. ${\cdot}10\dot{0}0837\dot{5} - {\cdot}009\dot{0}94\dot{8} = ?$ [$6{\cdot}0\dot{3}7\mathrm{i} = ?$

25. Multiply $3{\cdot}07607607\ldots$ by ${\cdot}3\dot{3}\dot{6}$.

26. Divide ${\cdot}01\dot{5}\dot{4}$ by ${\cdot}5\dot{6}$.

27. Find value of $\frac{4\frac{11}{12}}{5{\cdot}08\dot{3}} \times £\frac{3{\cdot}05}{2\frac{9}{20}}$.

28. What decimal of $3\frac{1}{2}$ sq. miles is 983 ac. 2 roods?

29. Bought 30 gallons of brandy for £24; at what price per quart must I retail it, so as to gain 15*s.* on the whole?

30. If when wheat is 5*s.* 3*d.* per bushel, I pay $15\frac{3}{4}d.$ for 5 lb. 1 oz. of bread, what must I pay for 7 lb. 5 oz. when wheat has risen to 6*s.* per bushel? (by Fractions.)

31. Find the square of ${\cdot}33333\ldots\ldots$

32. Find $\sqrt[3]{926859375}$; and calculate to seven places $\sqrt{\cdot3} - \sqrt{\cdot3}$.

---

33. What will £1642 10*s.* amount to if put out to interest at $4\frac{1}{2}$ per cent. from March 5th, 1860, to Nov. 20th, 1861?

34. A man owes me £100; of which £20 is due in two months, £30 in four months, and the rest in eight months. If he is willing to pay it all at one time, when ought the payment to be made?

35. If by selling coffee at 1*s.* 7*d.* per lb. I lose 5 per cent., what must be the price for me to gain 5 per cent.?

36. A commences business with £100, and at the end of six months puts in £300 more, having taken B in as partner two months previously. At the end of 12 months they take stock, and find their total gains to be £320. How much money ought B to have brought in to be entitled to half of the above sum?

37. If one merchant exchanges 173 cwt. 16 lb. of sugar, worth £1 12*s.* 7*d.* per cwt., with another for 12 cwt. 3 qr. 18 lb. of hops, at £23 8*s.* 6*d.* per cwt., which must pay money, and how much?

38. I invest equal sums of money in the Three-and-a-half per Cents. and in the Three per Cents., from which I derive equal incomes. How much below par was the latter stock, the price of the former being at a prèmium of $1\frac{1}{4}$?

39. It takes 28 yards of matting, $1\frac{1}{4}$ yard wide, to cover the floor of an office. How many yards will be required of another matting 5 ft. 3 in. wide?

40. A piece of timber 6 ft. 4·4 in. long, with a depth just equal to its width, contains 17190 solid inches. What is its depth?—Ans. ( ) ft. ( ) in.

---

## Q.

1.

$$\begin{array}{r} 389614701\frac{1}{2} \\ 9849898\frac{3}{4} \\ 57764389\frac{1}{2} \\ 825977\frac{3}{4} \\ 6138740\frac{1}{2} \\ 87126358\frac{1}{4} \\ 8797666\frac{3}{4} \\ 93205471\frac{1}{2} \\ 65378695\frac{1}{4} \\ 3421968\frac{1}{2} \\ 77895674\frac{3}{4} \\ 8379528\frac{1}{2} \\ \hline \end{array}$$

2.

$$1000427160094381\frac{1}{4}$$
$$9094007909506\frac{1}{2}$$

3.

$$8942659988745 \times 11\frac{3}{4}$$

4.

$$791468735671\frac{1}{2} \div 30\frac{1}{4}$$

5. Reduce two million nine hundred and forty-nine thousand one hundred and twenty pints to bushels.

6.

| *wks.* | *dys.* | *hrs.* | *min.* | *sec.* |
|---|---|---|---|---|
| 13 | 4 | 18 | 53 | 58 |
| 9 | 6 | 23 | 47 | 57 |
| 3 | 2 | 17 | 39 | 46 |
| 5 | 6 | 19 | 27 | 39 |
| 6 | 4 | 16 | 38 | 55 |
| 15 | 5 | 9 | 28 | 47 |
| 9 | 3 | 16 | 59 | 48 |
| 7 | 0 | 15 | 48 | 35 |
| 8 | 6 | 20 | 57 | 9 |

7.

| *yds.* | *qrs.* | *nls.* | *in.* |
|---|---|---|---|
| 64 | 0 | 1 | $1\frac{1}{2}$ |
| 59 | 1 | 3 | $1\frac{3}{4}$ |

8.

$$13s.\ 5\tfrac{1}{2}d. \times 129\tfrac{1}{2}$$

9.

| *a.* | *r.* | *p.* | *yd.* | *ft.* | *in.* |
|---|---|---|---|---|---|
| 14 | 2 | 35 | $10\frac{1}{4}$ | 3 | 112 ÷ 4 |

10. In 7 cwt. 3 qr. 14 lb. of sugar, how many parcels each 1 lb. 2 oz.?

11. Write down all the prime numbers between 122 and 154.

12. What is the content of the smallest vat that can be emptied by filling casks of 8, of 10, of 12, or of 18 gallons?

13. Find G.C.M.; and reduce $\frac{118300}{136500}$ to its lowest terms.

14. Reduce $3\frac{609}{10000}$ to an improper fraction.

15. 35 min. $22\frac{1}{12}$ sec. + $295\frac{3}{14}$ sec. + $857\frac{5}{6}$ sec. + 58 min. $34\frac{17}{21}$ sec. + 39 min. $49\frac{43}{84}$ sec. = ( ) hrs. ( ) min. ( ) sec.?

16. Find the difference between 3 gal. 3 qt. $1\frac{1}{11}$ pt. and 13 gal. 3 qt.

17. $(144484_{13} - 143957_{10}) \times \frac{39}{1977} = ?$ [$0\frac{5}{8}$ pt.

18. £1004 16*s.* $4\frac{1}{2}d. \div 7 = ?$

19. Find value of £$\frac{1}{6}$ + G $\frac{5}{12}$ + C $\frac{5}{9}$.

20. Reduce 3 roods $12\frac{1}{2}$ pol. $3\frac{1}{2}$ yds. to fraction of 1 acre.

21. 7 ton. 3 cwt. 20 lbs. at £1 17*s.* $5\frac{3}{4}d.$ per cwt. (by Practice.)

## Q.

22. Reduce $5\cdot\dot{7}\dot{2}$ to its equivalent vulgar fraction.

23. $\cdot4\dot{7}5\dot{6} + \cdot0540054005\ldots + \cdot5\dot{0}60\dot{5} + \cdot78368836883$

24. $\cdot36\dot{2}17\dot{5} - \cdot0\dot{0}573\dot{2} = ?$ [$\ldots + \cdot\dot{5} = ?$

25. Multiply $\cdot38$ by the product of $\cdot25$ and $\cdot006$.

26. Divide $300\cdot$ by $224\cdot$.

27. Find value of $£\cdot07 + 3\cdot5\dot{6}s. + 9\frac{4}{11}d.$ [2 ft.

28. Reduce $\frac{4}{9}$ of 12 fathoms to decimal of $\frac{8\frac{3}{3}}{3}$ of 1 yd.

29. A corn factor mixes 12 qrs. 1 bus. of wheat at £4 16*s.* per qr., and 168 bushels of another sort at £5 2*s.* per qr.; at what rate per bushel must he sell the mixture to gain £6 19*s.* on the whole?

30. At a saw mill 375 veneers were cut in 5 days of 8 hrs. each: how many days of 10 hrs. each will be occupied in turning out 1200 such veneers, the speed of the machine being increased in the proportion of 3 : 2?

31. What is the cube of $1\cdot\dot{5}$?—(Ans. in vulgar fraction.)

32. $\sqrt[3]{\cdot001331}$; and find a mean proportional between 23 and 207.

---

33. What will £500 amount to in 4 years, at 5 per cent. compound interest?

34. If a debt of £500 be payable thus:—£100 at present, £100 in one month, £100 at the end of three months, £150 at the end of four months, and the rest in six months; what is the equated time for the payment of the whole?

35. A merchant buys 24 cwt. of sugar at $5\frac{1}{2}d.$ per lb.; and sells $\frac{1}{3}$ of it at $6\frac{1}{2}d.$ per lb., $\frac{1}{4}$ of it at $6d.$, and the rest at $5\frac{1}{4}d.$; what profit does he make per cent.?

36. A and B enter into partnership; A contributing £300, and B £400. After 5 months A takes out $\frac{1}{4}$ of his capital, and at 9 months' end B is obliged to withdraw $\frac{2}{5}$ of his. If their profits at the year's end are £850, how must they share the money?

37. A gentleman travelling wishes to exchange 3636 marks 15 schillings, Hamburgh money, into British money, at 35*s.* 8*d.*, Flemish per £. sterling. How much will he obtain (35*s.* 8*d.* Flemish = 214 schil., and 16 sch. = 1 mk.)?

38. How much money must I lay out in the Three-and-a-half per Cents., when that Stock is at a discount of $12\frac{1}{2}$, to derive an income of £140, allowing a commission of $\frac{1}{8}$ per cent.?

39. The paper being a yard wide, and $1\frac{1}{2}d.$ per yard, what will it cost to paper a room, whose length is 18 ft. 3 in., height 14 ft. 9 in., and width 14 ft. 8 in.?

40. How many bricks must I order for a wall 8 ft. high, 1 ft. 8 in. wide, and 5 poles in length; the dimensions of a brick being 10, 4, and $2\frac{1}{2}$ in.?

## R.

1. A corn factor bought at one sale $12\frac{1}{2}$ quarters of wheat, and $3\frac{1}{4}$ quarters of barley; at another $9\frac{3}{4}$ of wheat, and $12\frac{1}{2}$ of beans; at a third $7\frac{3}{4}$ of barley, and the same of beans; at a fourth $6\frac{1}{2}$ of barley, and $12\frac{1}{2}$ of wheat; at a fifth $3\frac{1}{4}$ of barley, and $7\frac{1}{4}$ of beans. How many quarters of each will he have?

2. A drover has 12 bullocks, 120 pigs, and four-score sheep; he changes 30 pigs for 6 more bullocks and 12 more sheep; and again, three-score sheep for 18 pigs and 4 bullocks. How many animals of each kind has he at last?

3. A train consisted of 2 engines, 8 passenger carriages, and 4 luggage vans. How many tons did the train weigh, if each engine weighed $35\frac{3}{4}$ tons, each carriage $6\frac{1}{4}$ tons, and each van $7\frac{1}{2}$ tons?

4. Out of a bag containing 160 nuts, I gave $\frac{1}{4}$ to A, and then a quarter of what remained to B; dividing the rest equally between myself and two brothers. How many more fell to A's share than to my own?

5. In 36 boxes of sugar, each weighing 5 cwt., how many parcels of 16 lb. each?

6.

| *ac.* | *r.* | *pol.* | *yds.* |
|---|---|---|---|
| 7 | 3 | 20 | $19\frac{1}{2}$ |
| 2 | 2 | 28 | 16 |
| 17 | 1 | 19 | $28\frac{1}{4}$ |
| 18 | 3 | 17 | $18\frac{1}{4}$ |
| 15 | 3 | 24 | $24\frac{3}{4}$ |
| 9 | 2 | 22 | 17 |
| 6 | 2 | 18 | $5\frac{1}{2}$ |
| 18 | 3 | 9 | $14\frac{1}{4}$ |
| 7 | 0 | 15 | $19\frac{1}{4}$ |

7.

| *cub. yd.* | *ft.* | *in.* |
|---|---|---|
| 29 | 13 | 1000 |
| 6 | 19 | 1434 |

8.

| *qrs.* | *bus.* | *pks.* | *gal.* | *qt.* | *pt.* | |
|---|---|---|---|---|---|---|
| 3 | 7 | 3 | 1 | 2 | $1\frac{1}{2}$ | $\times 135$ |

9.

£4386 17*s.* $9\frac{1}{4} \div 9\frac{1}{4}$

10. Reduce 1605307 guineas into sovereigns.

11. Resolve 634887 into its prime factors.

12. Write down the first twenty multiples of 4; also the first twenty multiples of 6; and mark all the common multiples of 4 and 6.

13. Find G. C. M., and reduce $\frac{250471}{616777}$ to its lowest terms.

## R.

22. Reduce $\frac{1}{385}$ to its equivalent decimal.

23. } $6{\cdot}745 + {\cdot}88 - 63{\cdot}576 + 68{\cdot} - {\cdot}0875 - 5{\cdot} +$
24. } $4 = ?$ and prove by vulgar fractions.

25. Find the product of $\cdot 06\dot{7}2\dot{7}$ and $2{\cdot}8818181\ldots.$

26. Divide $82{\cdot}1265768$ by $4380{\cdot}$.

27. $3{\cdot}8614$ of $7{\cdot}6$ furlongs = ( ) m. ( ) f. ( ) pl. ( ) yd. ( ) ft. ( ) in.?

28. Reduce $2{\cdot}3\dot{3}\dot{8}$ of 4 gal. 1 pt. to decimal of 1 qr. 3 bus.

29. If $\frac{5}{7}$ oz. of tea cost $\frac{8}{21}s.$, what will $\frac{3}{5}$ lb. cost?

30. If 5 men can do a certain piece of work in 8 days, how long will it take 2 men and 7 boys to do a piece $2\frac{1}{3}$ times as large, calculating that 3 men are equal to 8 boys?

31. Raise $1{\cdot}1\dot{6}$ to its 4th power.

32. $\sqrt[3]{256047875}$; find a mean proportional between $2\frac{1}{2}$ and $15\frac{5}{8}$.

---

33. What will be the amount of £1500 lent out for 6 years at $5\frac{1}{4}$ per cent. compound interest? (neglecting fraction of I. D.)

34. If a man owes me £1000, half of which is payable in 6 months, and the rest in 4 months, what sum shall I receive from him immediately, allowing discount (true) at $5\frac{1}{2}$ per cent.?

35. By selling paper at 18*s.* 4*d.* per ream, I gain 10 per cent.; at what rate per quire must I sell it to gain 20 per cent.?

36. A prize, value £2610, is taken by a cruiser, and it is proposed to divide this sum among the ship's company in proportion to their pay, and the time each has been on board. What will be the share of each, supposing the captain to have been on board 20 months, at £6 a month; 2 chief mates 15 months, at £3 10*s.* per month; 3 second mates 12 months, at £3 a month; and 157 sailors 27 months, at £3 a month?

37. Find the exact measure (English) of an angle containing 24 grades French (90 degrees = 100 grades).—Ans. ( ) deg. ( ) min.

38. I laid out £3800 in the shares of a railway which pays $4\frac{1}{2}$ per cent., and have thus realized an income of £180. What was the market price of those shares?

## R.

14. Write out the definition of an improper fraction. Is $\frac{8}{8}$ an improper fraction according to your definition?

15.

| *E. ells.* | *qrs.* | *nls.* | *in.* |
|---|---|---|---|
| 6 | 3 | 2 | $1\frac{1}{2}$ |
| 3 | 0 | 0 | $1\frac{1}{3}$ |
| 7 | 2 | 1 | $2\frac{1}{5}$ |
| 8 | 3 | 3 | $0\frac{3}{4}$ |
| 0 | 4 | 3 | $1\frac{1}{7}$ |
| .6 | 0 | 3 | $2\frac{1}{14}$ |
| 5 | 3 | 2 | $1\frac{2}{3}$ |

16.

| *sq. pol.* | *yds.* | *ft.* | *in.* |
|---|---|---|---|
| 3 | $8\frac{1}{2}$ | 6 | 101 |
| 2 | $28\frac{3}{4}$ | 8 | $110\frac{5}{21}$ |

17.

£896 18*s.* $9\frac{5}{8}$*d.* × 6

18. 35 lbs. 10 oz. 18 dwt. $22\frac{6}{7}$ gr. ÷ 9.

19. Express in positive terms $2\frac{17}{18}$ of $1\frac{6}{33}$ sq. mile.—Ans. m. a. r. pl. yd. ft. in.

20. What fraction of 2 guineas is £$\frac{3}{7}$ + cr. $4\frac{3}{14}$?

21. 6380 at 15*s.* $11\frac{1}{4}$*d.* (by Practice; in 4 aliquot parts only.)

## R.

39. An apartment, 16 ft. 2 in. long, and 12 ft. 6 in. wide, took 86 sq. yards of paper to cover its walls. How high was it? Also a square room, whose height was 12 feet, took 55 yards of paper 1 yard wide, how long was the room?

40. If a cubic foot of water weigh 62·5 lbs. avoirdupois, what weight of water will a vessel hold which contains exactly 4 gallons (277·27 cubic inches = 1 gallon)?—Ans. ( ) lbs. ( ) oz. ( ) drs.

## S.

1. Henry VIII. began to reign in 1509, and reigned 38 years; Edward VI. reigned 6 years; Mary I. reigned 5 years; Elizabeth, 45 years; James I., 22 years; Charles I., 24 years; then there was no king for 11 years; next Charles II. reigned 25 years; James II., 3 years; William III., 14 years. In what year did the next Sovereign, Queen Anne, begin her reign?

2. There were in a cart 5 bags of saltpetre, which weighed altogether 2038 lbs. No. 1 weighed 279 lbs.; No. 2, 388 lbs; No. 4 as much as No. 1 and No. 2 together, and No. 5 weighed 287 lbs. No. 3 was either lost or stolen on the road; how much did it weigh?

3. A History of England consists of 12 volumes, each containing 327 pages; in each page 47 lines. Now, supposing each line to contain on an average 59 letters, find the total number of letters in the whole work.

4. In 1840 the silk used in Lyons was produced from four thousand millions of cocoons. Taking the length of fibre in each cocoon to be $\frac{1}{4}$ mile, how many times would the said silk wind round the earth (25,000 miles)?

5. Reduce twelve million five hundred and forty-four thousand poles to acres.

6.

| | (2½) | (20) | (16) |
|---|---|---|---|
| *rix-dols.* | *guild.* | *stiv.* | *pfenninge.* |
| 5 | 1 | 18 | 4 |
| 6 | 1¾ | 17 | 15 |
| 9 | 2¼ | 8 | 12 |
| 7 | 0¾ | 15 | 12 |
| 6 | 1½ | 14 | 13 |
| 8 | 2 | 8 | 6 |
| 7 | 1¼ | 12 | 10 |
| 3 | 1½ | 19 | 15 |
| 6 | 1 | 8 | 9 |
| 7 | 0¼ | 16 | 14 |

7.

| | (8) | (34) |
|---|---|---|
| *piastres.* | *reals.* | *maravedis.* |
| 327 | 2 | 12 |
| 316 | 5 | 28 |

8.

| | (10) | (10) |
|---|---|---|
| *francs.* | *decimes.* | *centimes.* |
| 5 | 8 | 7 × 67½ |

9.

| | (8) | (20) | (12) |
|---|---|---|---|
| *ducat.* | *lira.* | *soldo.* | *denaro.* |
| 72 | 6 | 18 | 6 ÷ 7 |

10. Reduce 23683 grains Tróy to lbs.

## S.

22. Change $\cdot 63\dot{0}$ into an equivalent vulgar fraction.

23. $94\frac{3}{80} + 586{\cdot}3998 - 93\frac{3}{40} - 474{\cdot}98945 - 16\frac{7}{25} +$

24. $28\frac{1}{64} = ?$

25. Multiply $\cdot 435$ by $\cdot 617171\ldots.$

26. Divide $83{\cdot}291436$ by $3{\cdot}745619$ correct to 4 places (exhibiting the contracted work).

27. Find value of $\cdot 88758758\ldots..$ of £2·7.

28. What decimal of 5 acres is $2{\cdot}05\dot{3}$ of 450 square yards?

29. What will be the price of $\frac{1}{6}$ quarter, when $\frac{5}{9}$ ton cost $£6\frac{2}{3}$?

30. A meadow of 12 acres, with a crop of 3 tons of hay per acre, was mown by 4 men in 5 days of 9 hours each; another of 16 acres was in like manner mown in 4 days by 5 men, working 10 hours each day; how many tons per acre did that crop average?

31. Calculate the following series:

$$3 - \frac{3^2}{1\times 2} + \frac{3^3}{1\times 2\times 3} - \frac{3^4}{1\times 2\times 3\times 4} + \frac{3^5}{1\times 2\times 3\times 4\times 5}.$$

32. Find $\sqrt[3]{21{\cdot}717639}$; and calculate to 7 places $\frac{1}{\sqrt{2}}$.

---

33. At what rate per cent., simple interest, would £749 1*s.* 3*d.* amount to £1168 10*s.* 9*d.* in 14 years?

34. Required the discount on a bill of £112 10*s.* drawn March 31st, at 7 months, discounted May 8th, at $6\frac{1}{2}$ per cent.?

35. Laid out £1200 in wine, at £50 per pipe; part of which being lost, I sold the remainder at 20 per cent. profit, and so realized £960. How many pipes were lost?

36. A, B, and C commenced business together as corn-dealers. A put in £1000, B £800, and C £2000. At the end of 4 months A put in £500 more. At the end of 6 months B took out £300, but 2 months after he put in £1000. C took out £600 at the end of 3 months, but 6 months after he put in £1200. At the year's end their clear gains amounted to £2500. Required the share of each.

37. Change £32 into French money; the course of exchange between London and Paris being 25 francs 80 cents per £ sterling.

## S.

11. Resolve 1075250 into its prime factors.

12. I observe the beams of 2 pumping engines descending together. How long shall I have to wait to see them descend together again, one making 4 strokes in a minute, the other 6?

13. Find G. C. M.; and reduce $\frac{6480}{117036}$ to its lowest terms.

14. Reduce $36\frac{1}{4}$ to an improper fraction, with denom. 20.

15.

| *cub. yd.* | *cub. ft.* | *cub. in.* |
|---|---|---|
| 23 | 15 | $1631\frac{5}{14}$ |
| 19 | 23 | $898\frac{2}{5}$ |
| 6 | 19 | $1274\frac{18}{35}$ |
| 14 | 7 | $965\frac{19}{70}$ |
| 38 | 25 | $1403\frac{1}{2}$ |
| 69 | 8 | $879\frac{3}{7}$ |

16.

| *yds.* | *qrs.* | *nls.* | *in.* |
|---|---|---|---|
| 6 | 3 | 0 | $1\frac{1}{5}$ |
| 4 | 3 | 2 | $1\frac{7}{8}$ |

17.

| *t.* | *cwt.* | *qrs.* | *lbs.* | *oz.* | *drs.* |
|---|---|---|---|---|---|
| 5 | 13 | 0 | 27 | 11 | $13\frac{5}{6}$ × 9 |

18. 9 mil. 6 fur. 35 pol. $4\frac{3}{4}$ yd. ÷ 8.

19. Express in positive terms $\frac{5}{9}$ yd. + $\frac{5}{9}$ E. ell.—Ans. ( ) qr. ( ) nl. ( ) in.

20. Reduce $\frac{5\frac{1}{2}}{3\frac{3}{10}}$ of £$\frac{3}{10}$ to fraction of $5\frac{3}{4}$ guineas.

21. 2867 at £5 15*s.* (by Practice; in one aliquot part only.)

## S.

38. A capitalist lays out £1210 in Consols at 75½, and sells out soon after when this stock has risen to 80¼; what is his gain, allowing ⅛ per cent. for brokerage both in buying and selling?

39. The floor of an office, which is an exact square, requires 66 yds. 2 ft. 1 in. of matting 2 ft. 1 in. wide. How long is the side?

40. The dimensions of a brick being 10, 4, and 2½ inches, how many will be required for a wall 164 yds. long, 18 in. thick, and 7 ft. high, deducting for 3 doorways, each 6 ft. 4 in. by 4 ft.?

## T.

1. An Irish steamer had on board 12 bullocks, a score and a half of sheep, 10 calves, and a number of pigs, 6 more than all the other animals put together. Required the total number of animals on board.

2. How many days are there from March 15th to May 28th?

3. A cattle dealer went to a fair with £250, and 15 hogs worth £6 each. These he sold; and then bought 7 horses at £30 a-piece, and 15 heifers at £4 a-piece. How much money did he take home?

4. In a school there are two dormitories; one containing 60640 cubic feet, the other 54880. The former is divided into 20 compartments, containing 4 beds each; the other into 14 compartments, containing 6 beds each; but in one compartment only 2 beds are occupied. Find in each dormitory the number of cubic feet of air allowed to each pupil.

5. In forty thousand nine hundred and sixty drams, how many stone of 14 lbs. each?

6.

| £ | s. | d. |
|---|---|---|
| 3 | 17 | $10\frac{1}{2}$ |
| 0 | 4 | 6 |
| 3 | 5 | $8\frac{1}{2}$ |
| 76 | 18 | $1\frac{1}{2}$ |
| 25 | 13 | 9 |
| 64 | 13 | $9\frac{1}{2}$ |
| 0 | 18 | $2\frac{1}{2}$ |
| 6 | 16 | $4\frac{1}{2}$ |
| 75 | 12 | 0 |
| 6 | 17 | $8\frac{1}{2}$ |
| 1 | 14 | $7\frac{1}{2}$ |
| 6 | 0 | $8\frac{1}{2}$ |
| 74 | 3 | 9 |
| 6 | 17 | $5\frac{1}{2}$ |
| 9 | 14 | $8\frac{1}{2}$ |
| 6 | 15 | $7\frac{1}{2}$ |
| 16 | 14 | $3\frac{1}{2}$ |
| 6 | 12 | $7\frac{1}{2}$ |
| 6 | 5 | 0 |
| 8 | 15 | $8\frac{1}{2}$ |
| 17 | 14 | 7 |
| 16 | 0 | $2\frac{1}{2}$ |
| 8 | | |

7.

| *reams.* | *quires.* | *sheets.* |
|---|---|---|
| 6 | 8 | $6\frac{1}{4}$ |
| 3 | 9 | 9 |

8.

| *pol.* | *fath.* | *in.* | |
|---|---|---|---|
| 6 | $1\frac{1}{2}$ | $29\frac{1}{2}$ | $\times\ 9\frac{1}{2}$ |

9.

| *tons.* | *cwt.* | *qrs.* | *lbs.* | *oz.* | *dr.* | |
|---|---|---|---|---|---|---|
| 4534 | 16 | 0 | 1 | 8 | 15 | $\div 273$ |

10. Reduce 3 ac. 3 r. 27 p. $6\frac{1}{4}$ yds. 6 ft. 128 in. to inches.

---

11. Write out the definition of a prime number.

12. Three men, A, B, C, travel round an island on the same road. A goes round in 5 days, B in 6 days, and C in 8 days. Supposing that they all start together, how many days will elapse before they all meet at their starting point again?

## T.

22. Change $6\frac{1}{770}$ into its equivalent decimal.

23. } ·6 — ·50625 — ·05 + ·075 + ·0125 (prove by vulgar
24. } fractions).

25. Multiply 6·375823 by 35·2716 correct to 4 places (contracted).

26. Divide 6·555 . . . by 7·06249 correct to 4 places (contracted).

27. $\frac{7{\cdot}56}{{\cdot}036} \div \frac{4\frac{1}{2}}{3}$ of ·0075 tons = ?

28. Express $4\frac{2}{7}$ of 5·36̇ shilling, as decimal of £8 6*s.* 8*d.*

29. If $\frac{2}{3}$ E. ell cost $1\frac{2}{3}$ of £19, what would $\frac{1}{5}$ yd. cost?

30. How many persons will £8 17*s.* 6*d.* support for 4 wks. 5 days, when £3 13*s.* $11\frac{1}{2}$*d.* will support 11 people for $2\frac{1}{2}$ wks. (by fractions)?

31. Calculate $2\left(\frac{1}{3} + \frac{1}{3 \times 3^3} + \frac{1}{5 \times 3^5} + \frac{1}{7 \times 3^7} + \text{\&c.}\right)$ correct to 6 places.

32. Find $\frac{1}{\sqrt[3]{4}}$; and $\frac{3}{2\sqrt{3}}$; each correct to 4 places.

33. In what time will £547 10*s.* amount to £568 15*s.* 3*d.* at $4\frac{1}{2}$ per cent. per annum (reckoning 365 days to a year)?

34. A bill of £274 10*s.* was drawn on May 12th at 5 months. What was it worth on August 14th; discount at 5 per cent.?

35. Sold 43 cwt. 3 qr. 23 lb. of rice for £71 15*s* $10\frac{1}{2}$*d.*, and gained thereby $\frac{2}{7}$ of the selling price; what did the rice cost me per lb.?

36. Divide 320 nuts between 3 boys, in such a way that as often as A receives 8, B shall receive 5; and for every 6 B receives, C shall receive 10.

37. A clothier exchanged 144 yards of broad cloth, worth 6*s.* 8*d.* per yard, with a farmer for wool, at 8*s.* 10*d.* a stone, gaining £5 by his bargain. How many stone of wool did he receive from the farmer?

## T.

13. Find G. C. M. of 48, 112, and 40.

14. Give another name for a whole number.

15.

| *roods.* | *poles.* | *yards.* |
|---|---|---|
| 1 | 1 | $17\frac{1}{5}$ |
| | 6 | $28\frac{1}{3}$ |
| 1 | 5 | $9\frac{8}{9}$ |
| | 3 | $22\frac{7}{16}$ |
| | 5 | $19\frac{3}{4}$ |
| | 7 | 20 |
| 1 | 1 | $18\frac{13}{18}$ |

16.

| *mil.* | *fur.* | *pol.* | *yds.* |
|---|---|---|---|
| 6 | 4 | 23 | $4\frac{1}{2}$ |
| 3 | 6 | 27 | $4\frac{7}{8}$ |

17.

| *qrs.* | *bus.* | *pks.* | *gal.* | *qts.* | *pts.* |
|---|---|---|---|---|---|
| 3 | 3 | 3 | 0 | 3 | $0\frac{5}{12} \times 10$ |

18. 13 ac. 3 r. 27 pl. $28\frac{3}{5}$ yds. $\div$ 8.

19. Express in positive terms $\frac{1}{11}$ mile + $13\frac{7}{9}$ pole.

20. What fraction of $15\frac{1}{7}$ ton is $7\frac{4}{5}$ of 16250 lbs.?

21. 4860 at £3 6*s.* $9\frac{3}{4}$*d.* (by Practice, in 3 aliquot parts only.)

## T.

38. A canal company, £500 shares, pays 4½ per cent., and during the past year its dividends amounted to £72000. How many shares have been taken up?

39. The paving of a square court cost £1 7*s.*, at the rate of 1*s.* 4*d.* per square yard. How long was it?

40. There is a garden 112 yds. long and 81 yds. wide. In excavating, at a distance, a square pond 63 ft. long, and 12 ft. deep, the earth was brought and spread evenly over the garden. How much did this raise the surface?

## U.

1. How many days of the year have passed on May 20th, 1861?
2. From March 25th, 1848, to Oct. 12th, 1851, how many days?
3. Find the continued product of 1268000, 30900, and 1500 (exhibiting the work).
4. Supposing that the cavity of the heart contains 2 oz. of blood, and that it contracts 4000 times in one hour; how many times in an hour does the whole mass of blood (320 oz.) pass through the heart?
5. In thirty-eight thousand and seven drams, how many [grains?

| £ | s. | d. |
|---|---|---|
| 62 | 7 | 4½ |
| 8 | 17 | 9¾ |
| 64 | 8 | 8¼ |
| 9 | 13 | 6½ |
| 126 | 5 | 7¼ |
| 38 | 17 | 8½ |
| 6 | 17 | 4¾ |
| 629 | 6 | 7¼ |
| 8 | 15 | 8 |
| 62 | 17 | 4¾ |
| 9 | 15 | 9¾ |
| 6 | 1 | 8½ |
| 62 | 5 | 6¾ |
| 7 | 12 | 8 |
| 88 | 17 | 3½ |
| 162 | 4 | 8 |
| 9 | 18 | 6¼ |
| 81 | 17 | 11¼ |
| 9 | 16 | 10½ |
| 0 | 7 | 9¾ |
| 6 | 15 | 8 |

7. A has £6875 14*s.* 0¾*d.*, and B has 2189760 farthings. If A receives from B 6181 farthings, and B from A £19 12*s.* 11½*d.*, how much will each have then?
8. What is the value of 9 bales of silk, each containing 6 parcels, each parcel containing 25 yards, worth 6*s.* 8½*d.* a yard?
9. If the duty on 75½ lbs. of coffee amounted to £2 7*s.* 2½*d.*, how much was that per lb.?
10. In £1 11*s.* 2*d.*, how many shillings, sixpences, and groats, of each an equal number?

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11. What are numbers called that are not Primes?
12. Find the lowest Integer that contains 1½, 4½, 6.
13. Find G. C. M. of 2400, 3456, 3312.
14. Write out the rule for reducing a mixed number to an improper fraction.
15. Collect into one quantity $\frac{5}{18}$, $\frac{11}{21}$, $\frac{25}{49}$, $\frac{19}{56}$, $\frac{17}{24}$.
16. What fraction added to $\frac{1}{2} + \frac{1}{5}$ will produce 1.
17. Is it necessary to reduce fractions to a common denom. before multiplying them together?
18. There are two fractions $\frac{3}{10}$ and $\frac{7}{15}$. To the quotient of the sum by the difference, add the quotient of the difference by the sum.
19. Find value of £$\frac{2}{9}$ — G. $\frac{4}{15}$ + hf. cr. $\frac{17}{18}$.
20. Reduce $\frac{3\frac{1}{2}}{6} \div \frac{21}{1\frac{1}{3}}$ of 18 barrels of 42 gallons each, to the fraction of 3¼ of 4 barrels, each containing 36 gallons.
21. 385 at £3 16*s.* 8½*d.* (by Practice, in 3 aliquot parts; 2½*d.* = $\frac{1}{8}$ of what?)

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## U.

22. Change ·12777 . . . . . and 8·06$\dot{3}$ into vulgar fractions.

23. 24. $\left.\begin{matrix}\\\\\end{matrix}\right\}$ $\cdot 4\dot{8}7\dot{6} + \frac{5}{9} - \frac{3}{5} - \cdot\dot{2}4\dot{0} + \cdot 3\dot{6} - \frac{2}{3\,0} = ?$

25. Multiply 365·1295 by 8·7563 to 2 places (contracted).

26. 32·4 ÷ 6758· correct to 5 places (contracted).

27. ·3 of $\frac{5\frac{1}{2}}{6\cdot6}$ yds. ∞ ·2 of $\frac{8\cdot4}{2\frac{2}{5}}$ E. ell.

28. Reduce £5·63636 . . . to decimal of 1 guinea.

29. Supposing that $\frac{5}{17}$ guinea will pay for $3\frac{1}{4}$ days' rent, how long could I hold the room for $£3\frac{3}{34}$?

30. If I borrowed £75 12*s*. 6*d*. for 18·25 years, at the rate of £·045 for every sovereign, for how many years must I in return lend £164 5*s*., the interest being £·05 per £.

31. How many individual rabbits would be produced during the 5th year, starting from a single pair, and supposing each pair to produce 16 pairs every year?

32. What number, multiplied by itself, will make 8·1796? And what is the 3rd root of 12326·391?

33. How much will a man have to pay for a loan of £1000 for 4 years, counting 5 per cent. compound interest?

34. Calculate the discount on a bill of £447 12*s*. 6*d*., drawn April 23rd at 6 months, discounted May 8th at $5\frac{3}{4}$ per cent.

35. Bought 16 cwt. 1 qr. 11 lb. of sugar for £28 12*s*. $2\frac{1}{4}d$., and sold it so as to gain $\frac{2}{7}$ of the selling price (that is, I sold it at such a price that $\frac{2}{7}$ of it was profit). What was that price per lb.?

36. A wine merchant mixes 36 gallons of wine at 16*s*. a gallon, 60 gallons at 12*s*., and 24 gallons at 18*s*. What must he charge per pint for the mixture if he wishes to gain £6 12*s*.?

37. Exchange 6824 rupees into francs; the course of exchange between Calcutta and London being $23\frac{1}{4}d$. per rupee; and that between London and Paris, £1 for 25 francs 60 cents.—Ans. ( ) f. ( ) c.

38. I sell out all my Stock from the Four per Cents. at 95, thereby realizing £11400. What price must the Three-and-a-half per Cents be, in order that on investing the above sum in the new Stock, I may receive the same income as before?

39. A bath, in shape an exact cube, was cased (4 sides and bottom) with porcelain tiles at $4\frac{1}{4}d$. per square foot; the cost was £5 13*s*. 4*d*. How deep was the bath?

40. A reservoir is 224 feet long, and 160 feet wide. How deep must it be to hold 10000 tons of water (cubic foot = $62\frac{1}{2}$ lbs.)?

## V.

1. How many years did the Roman Empire last, reckoning from the foundation of Rome (753 B.C.) to the taking of Constantinople by the Turks (A.D. 1453)?

2. Three boys are playing with nuts. A has 64, B 72, C 58. In the first game A forfeits 6 to B and 4 to C; in the second game he wins 12 from each of the others; in the third game C wins 13 from A and 1 from B. How many has each then?

3. A man consumes 31½ cubic inches of oxygen every minute; how many cubic inches is that in 24 hours?

4. Reckoning 277¼ inches to a gallon, how many gallons of oxygen does the man consume in the above 24 hours?

5. In 576 spaces of 5 poles each, how many miles?

| 6. 7. 8. 9. | | £ | s. | d. |
|---|---|---|---|---|
| 35 lbs. of sugar at 6½*d.* per lb. . . . . | = | | | |
| 12¾ lbs. of tea at 4*s.* 6*d.* per lb. . . . . | = | | | |
| 5 lbs. of mustard at 1*s.* 5*d.* per lb. . . . | = | | | |
| 9 hams at 13*s.* 6½*d.* each . . . . . | = | | | |
| 140 lbs. of soap at 5¾*d.* per lb. . . . . | = | | | |
| 67 lbs. of cheese at 9½*d.* per lb. . . . . | = | | | |
| 128 lbs. of candles at 6¼*d.* per lb. . . . . | = | | | |
| Take off $\frac{1}{20}$ part for discount . . . . . | = | | | |
| Amount . | = | | | |

10. Change 304 five pound notes into guineas, sovereigns, crowns, shillings, and sixpences; an equal number of each.

11. What factors have 144 and 210 in common? [tiple.'

12. Define the terms 'multiple' and 'least common mul-

13. Find the greatest number that will divide 243, 405, 486, 270; exactly.

14. Write 5 nines in such a way that the expression shall be equal to one thousand.

15. How are fractions prepared for addition?

16. How are fractions prepared for subtraction?

17. Explain the operation and the reason of 'cancelling;' taking $\frac{55}{16} \times \frac{77}{77}$ for an example.

18. What obscurity is there in such an expression as 'the quotient of $\frac{2}{3}$ and $\frac{3}{7}$?' Is it so with the term 'product of?'

19. Find the difference, in nails, between $\frac{2\frac{2}{3}}{\frac{6\frac{1}{4}}{16}}$ quarters of cloth, and $\frac{3\frac{1}{4}}{\frac{\frac{1}{2}+\frac{1}{3}+\frac{1}{4}}{1\frac{1}{2}+1\frac{1}{3}+1\frac{1}{4}}}$ of 24½ inches.

20. Reduce ½ ($\frac{2}{5}$ + $\frac{3}{7}$) of 1 lb. Avoir. to fraction of 1½ ($\frac{4}{5}$ − ¼) of 1 lb. Troy (1 lb. Avoirdupois = 7000 grains Troy).

21. 5 ac. 3 r. 16 poles at £60 17*s.* 5*d.* per acre (by Practice).

# V.

22. Reduce $\frac{23}{37}$ and $\frac{1091}{27730}$ to equivalent decimal fractions.

23. $5{\cdot}68\dot{7} + 3{\cdot}0\dot{2}\dot{5} - 1{\cdot}\dot{2}63\dot{5} + 3{\cdot}28 + 4{\cdot}15\dot{6}3\dot{4} - 3{\cdot}74\dot{0}\dot{8} -$

24. $\cdot25\dot{6}\dot{5} = ?$

25. Multiply 78·41963 by 918·2765 correct to whole numbers only (exhibiting the contracted work).

26. Divide 42·81875 by 5·837 correct to 4 places (contracted).

27. $\frac{\cdot\dot{3}}{\cdot2}$ of $\frac{3{\cdot}6}{\cdot024}$ of $\frac{1}{120}$ acre = ( ) ac. ( ) r. ( ) pl. ( ) yd. ( ) ft. ( ) in.?

28. Reduce $\frac{3}{4}$ of 1 E. ell + 12·85 inches to decimal of $\cdot\dot{5}$ yd.

29. If $39\frac{3}{4}$ sq. yd. cost £$3\frac{1}{10}$, what ought I to pay for $\frac{3}{4}$ acre?

30. If $\frac{3}{4}$ of a stack of hay brought me in £15 2*s.* 6*d.*, when the market price of hay was £4·4 per ton, what would $\frac{1}{12}$ of the same stack fetch, the price having risen to £7·5 per ton?

31. Find (in vulgar fractions) the difference between $\cdot2^3 - \cdot2^3$ and $(\cdot\dot{2} - \cdot2)^3$.

32. Find the 4th root of 1874161, and the 3rd root of ·000148877.

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33. What is the difference between the simple and the compound interest of £350 for 3 years at 5 per cent.?

34. If a person has to pay £120 in 8 equal monthly instalments, when may he fairly pay it all at once?

35. A corn factor mixes 3 qrs. 5 bus. of barley at 32*s.* per quarter, with 15 bushels of another sort at 26*s.* per quarter, and sells the mixture at 31*s.* 6*d.* per quarter. What is the gain or loss per cent.?

36. Distribute £2 6*s.* 3*d.* in the proportion of 4, 5, and 6. Also in the proportion of $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$.

37. If the course of exchange between Paris and London be 25 fr. 60 cents. for £1; between Paris and Hamburgh 29 francs for 16 marks; between Hamburgh and Vienna 300 marks for 298 rix-dollars; and between Vienna and Petersburg, $2\frac{1}{5}$ rix-dollars for 1 rouble; what rate of exchange does this give between London and Petersburg? And what difference will there be between remitting £250 from London to Petersburg by the above circular route, and sending the same direct at $36\frac{1}{4}$*d.* per rouble?

38. What per-centage should I clear by transferring my money from the Four per Cents at 95, to a railway company which pays 5 per cent., whose shares are at 114?

39. A room is 18 ft. 7 in. long, 14 ft. 3 in. high, and 14 ft. 3 in. wide. What will it cost to paper its walls, the paper being 3 qrs. wide, and $2\frac{1}{4}$*d.* a yard; deducting for 4 windows, each 12 ft. high, and 3 ft. 6 in. wide?

40. A vessel is 3·03 inches long, 2·001 inches broad, and 4 inches deep. What decimal of a pint does it contain (277·27 cubic inches = 1 gallon)?

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## W.

1. Express in signs, and prove that the sum of two hundred and thirty-six, and seventy-five, is equal to the sum of one hundred and forty, plus the sum of sixty-eight and one hundred and three.

2. Express in signs, and prove that the difference of six hundred and fifty-seven, and two hundred and thirty-eight, is equal to two hundred plus the difference of three hundred and seventeen, and ninety-eight.

3. Express in signs, and prove that the product of six hundred and seventy-eight, and two hundred and forty, is equal to the product of two hundred and twenty-six, and eighty, multiplied by nine.

4. Express in signs, and prove that the quotient of one hundred and eighty-nine, by three, is equal to the product of seven and nine.

5. Add together 21600 halfpence, 312 crowns, and 10320 pence.—Ans. in £.

6. 7. 8. 9.

16 quires Drawing-paper, at 2*s.* 3*d.* per quire =
75 Bibles, at 3*s.* 4*d.* each . . . . . =
69 Arithmetics, at 1*s.* 6*d.* each . . . . . =
4 dozen Exercise Books, at 6*d.* each book . =
12 Hymn Books, at 2*s.* 3*d.* each . . . . =
3 dozen Slates, at 10*d.* each slate . . . . =
7 boxes Pencils, at 1*s.* each . . . . . =

Take off 1*d.* for every shilling

£

10. Out of a field containing 74 ac. 1 r. 32 pl. 17 yds., how many gardens each 3 r. 2 p. 24½ yds. could be formed?

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11. Express 1195 in the senary scale.

12. Can I pay a debt of £3 with florins, sixpences, or half-crowns indifferently? Find the smallest debt that could be so paid.

13. Define the terms "measure," "common measure," and "G. C. M."

## W.

22. Reduce ·03919519519 . . . and 6·13$\dot{6}$ to vulgar fractions.

23. } ·6$\dot{7}\dot{5}$ − ·3954 − ·06$\dot{2}\dot{4}$ + ·3$\dot{0}$94$\dot{0}$ − ·$\dot{7}\dot{5}\dot{9}$ + ·57$\dot{3}$ +
24. } ·0i827 = ?

25. Multiply ·316825 by 41·87639 correct to 4 places (contracted).

26. Divide 294·189762 by 3·49176 correct to 4 places (contracted).

27. ·0$\dot{3}$ of 6 days 21 hours + $\frac{\frac{1}{\dot{8}}}{\cdot\dot{3}}$ of 86 hrs. 24 min. = ?

28. Express £4$\frac{3}{7}$ as a decimal of 372 crowns.

29. If 3 men can earn $\frac{2}{3}$ of £5$\frac{2}{5}$ in 1$\frac{1}{4}$ days, how long will they be earning £8$\frac{2}{5}$?

30. If $\frac{3}{8}$ of $\frac{4}{5}$ of my share in a mine is worth £31 4*s.*, when the ore sells for £10 8*s.* per ton, what will $\frac{3}{8}$ of $\frac{2}{3}$ of my share be worth, the price of the ore having risen to £12 1*s.* 3*d.* per ton (to be worked by decimal fractions).

31. What power of 3 is 729? and what power of 4 is 16384?

32. Find $\sqrt{2\frac{1}{4}}$. Give another term for the "extraction of roots."

---

33. Required the difference between the simple and the compound interest of £1500 for 3 years at 4 per cent.

34. What would a banker gain by discounting a bill of £2913 3*s.* 4*d.*, drawn May 1st at 7 months, and discounted August 9th, reckoning interest and discount at 4 per cent.?

35. Sold 3$\frac{1}{2}$ cwt. of sugar at 5$\frac{1}{2}$*d.* per lb.; thereby gaining £1 4*s.* 6*d.* What would have been the loss per cent. had it been sold at 4$\frac{1}{2}$*d.* per lb.?

36. Two merchants join their capitals, which are such that for every £3 A puts in, B subscribes £4. At the end of 4 months, A increases his capital by $\frac{1}{3}$, while B withdraws $\frac{3}{4}$ of his. What portion of a loss of £170 at the year's end should each sustain?

37. When the exchange between London and Hamburgh is £1 for 13$\frac{10}{16}$ marks; between Hamburgh and Amsterdam, 27 marks for 24 florins; between Amsterdam and Paris, 28 florins for 57$\frac{1}{2}$ francs; between Paris and New York, 51 francs for 10$\frac{1}{2}$ dollars; and lastly, between New York and Cadiz, 80 dollars for 100 piastres; how much is a piastre worth in British money?

## W.

14. Express the ratio $7\frac{3}{4} : 5\frac{5}{6}$ in the smallest possible integers.

15. To the sum of one-fifth of half a dozen, and one-seventh of a score, add as much more.

16. A father earns $\frac{2}{3}$ of the weekly income, a mother $\frac{1}{6}$, and their two children the rest in equal shares. What fraction is this of the whole?

17. What fraction must be divided by $\frac{11}{7}$ to form the fraction $\frac{93}{121}$?

18. I took a bag of nuts to a school, and gave half of it to the first class, $\frac{1}{3}$ to the second, $\frac{1}{8}$ to the third, and the rest to the fourth class, which just afforded these one a-piece. How many a-piece had the boys in the other 3 classes, the school containing 96 boys in 4 equal classes?

19. What will the carriage of $\frac{19}{20}$ cwt. for 80 miles cost, at $\frac{1}{4}d.$ a lb. per mile?

20. In gunpowder, for every dram of sulphur and of charcoal, there are six of saltpetre. How much of each in $\frac{3}{5}$ lb. of powder?—Ans. in oz. avoirdupois.

21. What is meant by "aliquot parts?" Make a table of the aliquot parts of a shilling.

## W.

38. If a capitalist transfers £7850 Stock from the Four per Cents. at 96, to the Three-and-a-half per Cents., and loses £19 6*s*. of income by so doing, what must have been the market price of the latter stock?

39. A room is 13 ft. 10 in. high, 17 ft. 2 in. long, and 15 ft. 10 in. wide. What will be the expense of covering the floor with carpet, $1\frac{1}{3}$ yd. wide, at 3*s*. 4*d*. per yard, and the walls with paper, $1\frac{1}{4}$ yd. wide, at $1\frac{1}{2}$*d*. per yard?

40. There is a cistern 15 ft. $7\frac{1}{2}$ in. long, 5 ft. wide, and 3 ft. $1\frac{1}{2}$ in. deep. Another cistern, holding just as many gallons, is in shape an exact cube. How deep is it?

## X.

1. } $74 + 67 + 48 - 39 - 18 + 75 - 23 - 40 + 60 + 15 - 8 = ?$
2. } $23 - 15 - 31 + 18 + 70 - 36 + 53 - 28 + 42 - 8 = ?$

3. Find the difference of the two following expressions:—

$$138 + 62 - (17 \times 8)$$
$$(138 + 62 - 17) \times 8.$$

4. Find the sum of the three following expressions:—

$$(48 + 60) \div (12 - 9)$$
$$48 + (60 \div 12) - 9$$
$$(48 + 60) \div 12 - 9.$$

5. Add together 3075 seven-shilling pieces, 4305 crowns, and 14848 sixpences, and reduce the sum to fourpenny pieces.

6. 7. 8. 9.

Make out the following account:—Sold on March 5th, 1861, 6 pieces of calico, each 18½ yds., at 7½*d.*; 4 pieces of printed linen, each 12¾ yds., at 14*d.*; 15 pieces of muslin, each 15 yds., at 13*d.*; 7 doz. pair of stockings, at 10½*d.* per pair; 7 pieces of ribbon, each 84 yards, at 5½*d.*; 456 yds. of nankeen, at 15¾*d.*; and 9 rolls of flannel, each 28 yds., at 21¼*d.*

Packing, 8*s.* 3*d.* Cordage and porterage, 2*s.* 6*d.* Discount at 5 per cent. (that is, take off $\frac{1}{20}$th of whole amount.)

10. How many parcels of 14 lbs., 12 lbs., and 9 lbs., an equal number of each, can be weighed out of 3 cwt. 14 lbs. of sugar?

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11. Convert $(6375)_{10}$ into the septenary scale.

12. A boy has collected a bag of farthings. He finds that he can place them in piles of 4, of 6, or of 9 each, and have none over. But on trying to arrange them in piles of 7 each, he finds he has 4 over. Find the lowest sum of money with which this is possible.

13. Find the highest number that will divide 1890, 2205, 960, 1540, and leave no remainder.

14. There are in a field 136 animals, horses, cows, and sheep. The horses are 10 in number, the cows three times as many. What fraction of the whole do the sheep represent?

15. A reservoir can be emptied by 3 pipes, A, B, C. Now A by itself will carry off the water in 6 hours, B by itself in 8 hours, and C by itself in 4 hr. 48 min. If all the pipes were set open together, in what time would the full reservoir be emptied?

16. A father and son together can earn a certain sum in 6 days; the father by himself could earn it in 9 days. How long would the son be in earning it all?

17. }
18. } $1 + \frac{1}{1} + \frac{1}{1 \times 2} + \frac{1}{1 \times 2 \times 3} + \frac{1}{1 \times 2 \times 3 \times 4} + \frac{1}{1 \times 2 \times 3 \times 4 \times 5} = ?$

19. Express $\frac{5}{12}$ ∞ $\frac{17}{36}$ of an oz. Troy, in the Apothecaries' scale.

20. Reduce 5 furlongs to poles, yards, and feet. Also $\frac{1}{1650}$ furlongs to fraction of a foot. Is there any real difference between the reductions?

21. 46 days 11 hrs. 35 min. at £1 1*s.* 5½*d.* per day of 12 hrs. (by Practice; retaining fractions.)

# X.

22. Change $\frac{7}{79}$ into a decimal; also $\frac{3}{2240}$.

23. } In *Simple* Addition and Subtraction, the Rule directs us to arrange
24. } the numbers or lines, units under units, tens under tens, &c. Does that rule hold good in Decimals? Illustrate.

25. Multiply 62·591438 by 26·8714 to 3 places (contracted).

26. Divide 628·17 by 7·39124 correct to 2 places (contracted).

27. Out of $£\frac{41\frac{2}{3}}{80}$ I paid away ·035 of 17*s.* 6*d.*; and again ·1$\dot{5}$ of 3*s.* 9*d.* How much had I still remaining?

28. What decimal of $21\frac{2}{11}$ square poles is 3 sq. poles 13·$\dot{6}$ yds.?

29. What will be a man's wages for 4·48 days, if I pay him £5·125 for 3·2 weeks (calculating 7 days in the week)?

30. How many men will be required to dig a trench $129\frac{3}{8}$ yds. long, $5\frac{1}{2}$ ft. wide, and $2\frac{1}{2}$ ft. deep, in $2\frac{3}{8}$ days of $9\frac{1}{2}$ hours each, when it took 9 men $2\frac{3}{8}$ days of 10 hours each, to dig a trench 162 yds. long, $6\frac{1}{4}$ ft. wide, and $1\frac{1}{2}$ ft. deep?

31. Express in signs, and prove that the difference between the square of 18 and the 4th power of 4, exceeds the 6th power of 2 by 4.

32. How could the 6th root be found? Find $\sqrt[6]{2565726409}$.

---

33. Required the amount of £20,000, at compound interest, for 4 years 146 days at 5 per cent.

34. If on a pianoforte (the net price of which must be £120) the seller wishes to throw off 20 per cent., what must he ask as the gross price of the instrument?

35. Bought 8 chests of tea, each 144 lbs., at 5*s.* a lb.; $\frac{1}{4}$ of which, not turning out so good as I expected, I was obliged to sell at 3*s.* $1\frac{1}{2}$*d.* a lb. How much per cent. must I lay upon the remainder, so as neither to gain nor lose by the whole?

36. In our silver coinage 74 parts are pure silver, and 6 copper. If 1 lb. Troy of this mixture is coined into 66*s.*, what quantity of pure silver is there in 50*s.*?—Ans. ( ) oz. ( ) dwt. ( ) gr.

37. If in exchange for 4 cwt. 3 qr. 14 lb. of tobacco, at £2 4*s.* 8*d.* per cwt., I receive 13 yds. of cloth, what ought the cloth to be worth per E. ell?

38. A person has an income derived from £3360, which was originally invested for him in the Four per Cents. at 96. If he now sells out at 94, and invests one half of the proceeds in Railway Stock at $82\frac{1}{2}$, which pays a dividend of 3 per cent., and the other half in Bank Stock at $164\frac{1}{2}$, paying $8\frac{1}{2}$ per cent. dividend, what difference will he find in his income?

39. From a field 328 yds. long, and 300 yds. wide, how many gardens could be formed, each 144 ft. long, and 75 ft. broad?

40. In the corner of a yard which measures 18 ft. by 15 ft., a cubical pit is dug to the depth of 8 feet. If the earth were spread evenly over the rest of the yard, how much would it raise the surface? (Exact answer.)

---

# Y.

1. Add into one sum 39, 92, 47, 56, 45, 78, 124, 236, 240, 329, 407, 95; and write out the result in Roman numerals.

2. What number added to nine hundred and ninety-one will make ten thousand and sixty?

3. Express in signs, and prove that the sum of sixty-five and twenty-four, multiplied by ninety-eight, exceeds the continued product of fourteen, eighty-eight, and seven, by the difference of twelve and one hundred and ten.

4. In a long division sum the dividend is 41872, quotient 664, remainder 40; what was the divisor?

5. If I change a £10 note for 4 sovereigns, 6 half ditto, and for an equal number of florins, half-crowns, shillings, sixpences, four-penny pieces, three-penny pieces, and pennies; how many of these latter coins shall I have?

6. 7. 8. 9.

Make out the following account:—Sold, March 8th, 1861, 4 casks of madder, each 8 cwt., at $8\frac{1}{4}d.$ per lb.; 6 hhds. of sugar, each $3\frac{1}{4}$ cwt., at $5\frac{1}{4}d.$ per lb.; $15\frac{3}{4}$ qrs. of oats, at $5s.$ $8\frac{1}{4}d.$ per bushel; 12 bags of cotton, each $2\frac{1}{2}$ cwt., at $20\frac{1}{4}d.$ per lb.; $7\frac{1}{2}$ tons logwood, at $43s.$ $9\frac{1}{2}d.$ per cwt.; add the labour of 2 men for $2\frac{3}{4}$ days, at $15s.$ each per week. Take off a discount of 8 per cent. (divide by $12\frac{1}{2}$).

10. The fore wheel of a coach is $8\frac{1}{4}$ feet round, the hind wheel $12\frac{1}{2}$ ft. How many times will the latter turn less than the former, in $1\frac{1}{4}$ mile?

11. Transfer 3345 from the senary scale to the septenary.

12. A schoolmaster finds that when he places his boys in files of 4, or 5, or 6, he always has one boy remaining. But if he arranges them in sevens, he has none over. How many boys has he?

13. In a town there are 3 schools: one containing 336 pupils, a second 147, and a third 273. In all 3 the classes are equal in numbers, and are as few (under this arrangement) as could possibly be. How many classes are there in each school?

14. Reduce $4\frac{3}{7}$ to an improper fraction, and prove the Rule.

15. Express in signs, and prove that five-twelfths of a gross is equal to the sum of three-fourths of two score, and one-third of seven dozen and a half.

16. A reservoir can be filled by one pipe in 12 hours, and by another in 15. It has also a discharging pipe, which will empty it in 6 hours. Suppose the reservoir to be full, and all 3 pipes to be set open together, in what time would it be empty?

17. The divisor was $\frac{3}{5}$, quotient $\frac{4}{7}$, remainder $\frac{2}{175}$; what was the
18. dividend?

19. Reduce $\frac{3}{5}$ $(2\frac{3}{7} - \frac{5}{8})$ lb. Troy to fraction of $\frac{3}{5}$ $(\frac{11}{16} + \frac{3}{112})$ cwt.
20.

21. Find the value of 6 oz. 18 dwt. 18 gr. of silver at $5s.$ $7\frac{3}{4}d.$ per oz. (by Practice.)

# Y.

22. What vulgar fraction is the equivalent of $\cdot 03\dot{3}\dot{4}$?

23. $5\cdot 7\dot{4}1\dot{8} + 3\frac{3}{7} + \cdot 016640164016 \ldots + 5\cdot 24 + 18\cdot 35\dot{6} = ?$

24. From $6\cdot 360156020156020 \ldots$ take $6\frac{1}{110}$.

25. Write out and prove the Rule for the Multiplication of Decimals.

26. Divide $9\cdot 2715386$ by $\cdot 32\dot{8}$ correct to 4 places (contracted).

27. A person coming to pay me a bill, I threw off $\cdot 025$ of it; so he only paid me £60·9375. What was the bill?

28. What decimal of $\cdot 0014$ of $12\frac{2}{7}$ E. ells is $\cdot 0012$ of 5 yd. 1 qr.?

29. If 12 oranges be worth 7 lemons, and 17 lemons be worth $\frac{4}{21}$ lbs. of tea, what is the value of 5 lbs. of tea when oranges are selling at 5 for 2*d.*?

30. A ship, with 300 men on board, is becalmed, with only 3 weeks' provisions. The captain, therefore, reduced the rations from 24 oz. to 18 oz., and sent away, by a passing steamer, a part of his men, by which he was enabled to hold out 19 days over his time. How many were sent away?

31. Is 1350 a perfect square? What factor is wanting? Illustrate.

32. Find a mean proportional between 9 and 16. Also between ·5 and $\frac{9}{250}$.

---

33. A person lays by £120 per annum, and improves it at the rate of 5 per cent. compound interest. How much is he worth at the end of 4 years?

34. What is the present worth of £2431 0*s.* 3*d.* due in 4 years, reckoning 5 per cent. compound interest?

35. A corn factor mixes £24 worth of wheat, at 8*s.* per bushel, with £24 worth, at 10*s.* per bushel; and sells out the whole at 9*s.* per bushel. How much per cent. does he gain or lose?

36. A, B, and C dissolving partnership divide their profits; A, whose money was in the business 18 months, receives £540; B's share was £300, and his money had been in the concern 4 months; and C had £350 for 7 months. Query the whole stock, B's gain being exactly equal to his stock?

37. A West India merchant exchanges 5 cwt. 1 qr. 4 lb. of sugar, worth 5*d.* a lb., and 3 cwt. more at $7\frac{1}{2}d.$ a lb., with a clothier, for broadcloth, at 2*s.* 1*d.* per yard. The latter gained $9\frac{3}{5}$ per cent. on the value of his cloth. Required the number of yards.

38. A capitalist sells out £1250 stock from the Three per Cents. at 88, and with the proceeds buys Railway Shares at $137\frac{1}{2}$. He thereby gains $\frac{1}{8}$ more income. What does the railway pay per cent.?

39. There is a courtyard, 120 ft. 6 in. long, and 80 ft. 8 in. wide, with a walk 8 ft. 6 in. wide running all round inside. What will it cost to pave the walk at 3*s.* 9*d.* per square yard; and to pitch the centre part with pebbles at 1*s.* 2*d.* per square yard?

40. If a piece of logwood, 1 ft. 4 in. long, 11 in. wide, and 9 ft. long, cost 27*s.* 6*d.*, what must be the length of another piece that is 10 inches square at the ends, and which cost 12*s.* 6*d.*

---

## Z.

1. 637152 + 49183 + 782516 + 382194 + 8375 + 61203. Work the sum and prove it, 1st by the axiom "the whole is equal to the sum of its parts;" and 2nd by "casting out the nines." [methods.

2. Subtract 3198506 from 3271688; and prove by both of the above

3. Multiply 27156 by 275. Prove by working the sum in as many different ways as you can; and also by "casting out the nines."

4. Divide 4208627 by 385. Prove 1st by multiplication, 2nd by the method of factors (5, 7, and 11), and 3rd by "casting out the nines."

5. From 3 cwt. of sugar, how many bags, each 12, 8, and 4 lbs., an equal number of each, can be weighed out?

6. 7. 8. 9.

On the first-floor of a loft there are 10 hhds. of sugar, each weighing 3 cwt. 3 qrs. 26 lbs., and 18 boxes, each containing 1 cwt. 2 qrs. 12 lbs. On the second floor there are 6 hhds., each weighing 3 cwt. 3 qrs. 19 lbs.; 8 boxes, each 2 cwt. 17 lbs.; and 5 casks, each 3 cwt. 1 qr. 22 lbs. If one-fourth of this last is sold off, and one-fifth of that in the upper room, how much more sugar is there left on one floor than on the other?

10. Out of 12 oz. 14 dwt. 22 grs. of silver, how many dozen spoons could be made, each spoon weighing 3 dwt. 4 gr. (exact answer)?

---

11. Show that $(1201121)_3 = [88t]_{12}$.

12. In an amphitheatre I observe that the horse on the outer circle goes round once in $2\frac{1}{2}$ minutes, a horse in the inner ring once in $1\frac{1}{4}$ minutes; while a third horse, running in a circle between these, takes $1\frac{3}{4}$ minutes in going round once. At a certain moment I observe them all to be abreast: when will they come into the same position again? and how many revolutions will each have made?

13. A relieving officer pays away £1 13*s.* 10*d.* to his male paupers, and £2 13*s.* 2*d.* to the females, giving each, whether man or woman, an equal allowance. If this was the greatest he possibly could give with the above sum of money (leaving nothing over), find the number of each sex.

14. Express in the smallest integers the ratio $3\frac{1}{10} : 4\frac{7}{15}$.

Work the four next sums by the rules in Fractions—

15.

| £ | s. | d. | £ |
|---|---|---|---|
| 6 | 0 | $7\frac{1}{2}$ | $= 6\frac{1}{32}$ |
| 4 | 1 | 8 | = &c. |
| 1 | 5 | 0 | = |
| 2 | 3 | 9 | = |
| 4 | 0 | 5 | = |
| 0 | 16 | 8 | = |
| 4 | 0 | $2\frac{1}{2}$ | = |
| 12 | 17 | 6 | = |
| | | | = |

16.

| lbs. | oz. | dwt. | grs. | lbs. |
|---|---|---|---|---|
| 6 | 3 | 9 | 14 | = 6 &c. |
| 3 | 5 | 18 | 18 | = |
| | | | | = |

17.

| m. | f. | pl. | yd. | |
|---|---|---|---|---|
| 1 | 5 | 28 | $3\frac{1}{7}$ | × $1\frac{1}{3}$ |

18.

| t. | cwt. | qrs. | lbs. | oz. | |
|---|---|---|---|---|---|
| 1 | 9 | 1 | 9 | $5\frac{1}{4}$ | ÷ 22 |

19. A publican after using $\frac{2}{3}$ of a cask of beer, sold $\frac{4}{5}$ of the remainder for 27*s.* 6*d.* What was the whole cask worth?

20. What fraction of an acre must be added to 1 rood $25\frac{1}{2}$ yds. to make it equal to $2082\frac{1}{2}$ square yards?

21. In payment of the rent of a field of 10 ac. 2 r. 16 pl. at £1 19*s.* 5*d.* per acre, I took 6 cwt. 3 qr. 19 lbs. of potashes worth £3 1*s.* 7*d.* per cwt., how much money must I return? (Work by Practice.)

# Z.

22. What kind of vulgar fractions will produce repeating decimals? Will $\frac{3}{10}$ terminate? Will $\frac{2}{5}$? Will $\frac{21}{350}$? Give reasons.

23. Work the 4 next sums by the rules in Decimal Fractions—

23.

| £ | s. | d. | | £ |
|---|---|---|---|---|
| 7 | 1 | 6 | = | 7·075 |
| 6 | 7 | 6 | = | |
| 4 | 2 | 9 | = | &c. |
| 1 | 6 | $7\frac{1}{2}$ | = | |
| 5 | 0 | $8\frac{1}{4}$ | = | |
| 6 | 13 | 9 | = | |
| 3 | 0 | $3\frac{3}{5}$ | = | |
| | | | = | |

24.

| E. ells. | qrs. | nls. | in. | | E. ells. |
|---|---|---|---|---|---|
| 5 | 3 | 2 | $1\frac{1}{2}$ | = | 5 |
| 1 | 4 | 0 | 2 | = | |
| | | | | = | |

25.

| qrs. | bus. | pks. | gals. | qts. | pts. | |
|---|---|---|---|---|---|---|
| 3 | 6 | 3 | 1 | 3 | $\cdot 1\frac{1}{4}$ | × 12 |

26.

7 *oz.* 6 *drs.* 1 *scr.* 19 *grs.* ÷ 5

27. In a class there are two boys aged 14; three, whose united ages amount to 40·75 years; two, each 12·875 years; six, each 11·9 years; one, aged 10·375; four, each 10·05; and two, each $9\frac{1}{2}$ years. What is the average age of the whole class (30 days = 1 month)?

28. Out of ·4 of a crown, I spent $\frac{1}{7}$ of half a guinea; what decimal of £1 have I still remaining?

29. In a proportion the 2nd term was $3\frac{1}{2}$, the third 8, the fourth 10. What was the first term? In another sum, the first term was $5\frac{1}{4}$, the second 7, and the fourth 4. What was the third term?

30. If 54 lbs. of sugar cost £1 0*s.* 3*d.*, what will 20 lbs. of another sort come to; $10\frac{1}{2}$ lbs. of the former being equal in value to 9 lbs. of the latter?

31. Show what factor is wanting to make 266200 a perfect cube?

32. Calculate $\sqrt{16{\cdot}1049} \propto \sqrt[3]{115{\cdot}9692}$ correct to 4 places of decimals.

33. If a man, who has an annuity of £120, forbears to draw it till the end of 5 years, what sum will he then receive; compound interest being allowed at 5 per cent.?

34. What sum of money must be paid down in order to receive £14060 16*s.* in 3 years' time, reckoning compound interest at 4 per cent.?

35. Sold a pianoforte for £45, and lost 10 per cent. by it; whereas considering my outlay and trouble I ought to have gained 5 per cent. What may I consider as my total loss in money?

36. Divide 7*s.* 8*d.* among 4 boys in such a way that as often as A receives 3 farthings, B receives 5; as often as B receives 3, C receives 5; and as often as A and B together receive 9, C and D together receive 14.

37. A merchant of Hull exchanges 320 yds. of cloth, at £2 per ell, with another of Hamburgh for flax, worth 6656 marks 4 schillings; and agrees to have the balance remitted to him at Paris. How much will he receive in French money, the courses of exchange being the same as in (B) and (S)?

38. A horse dealer having bought six horses at £75 a-piece, is obliged to sell 2 of them, so as to lose 10 per cent. on them; what must he get for each of the others, in order to gain 4 per cent. on his whole outlay?

39. There is a meadow 81 perches long, and 48 perches wide, with a square pond in the centre, which occupies just $\frac{1}{9}$ of the ground. How far are the sides of the pond from the sides of the meadow parallel to them?

40. A bath 8 ft. 2 in. long, 6 ft. wide, and 4 ft. deep, was excavated at an expense of $1\frac{3}{4}$*d.* per cubic foot; another, an exact cube, was made at a cost of 5*s.* 4*d.* per cubic yard; costing just as much as the former. Required its depth.

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